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IT IS THE SET OF THE SAILS, NOT THE
DIRECTION OF THE WIND THAT
DETERMINES WHICH WAY WE WILL GO

-JIM ROHN-

TABLE OF CONTENTS

VISIT OUR WEBSITE

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HONORS ARTS AND ENTERTAINMENT TECHNOLOGIES

RANJAN VELUNDANDI

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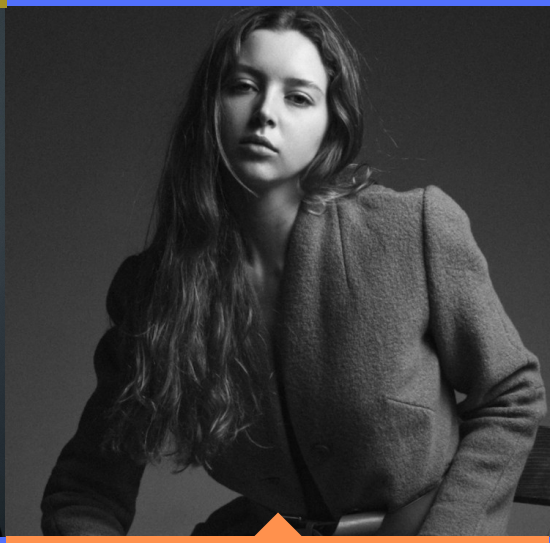

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ROGER ZHONG

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A Note From the Editors

Hello everyone, and welcome to the first edition of the Texas Design Journal! We are a publication dedicated to documenting the design experiences of students at the University of Texas at Austin. The journal was founded in May of 2020 to provide a platform for student voices in the expansive field of design. Our first volume is a landmark edition as it marks the year our team set sail and founded UT Austin's first scholarly journal dedicated to documenting student product design research. This first edition covers pertinent topics such as designing ethical AI for vulnerable populations, food insecurity amongst college students, the restructuring of instructional design in the COVID-19 pandemic, and much more. Since design is such a broad field, we hope that anyone - regardless of their major - can contribute to the journal with their design-related thoughts, ideas, and proposals.

In this edition, you will find articles about academic, extracurricular, and professional experiences. We have categorized this journal into the three crucial components of the design process: immersion, ideation, and analysis, with relevant articles within each category. With each article, we hope you can find something meaningful to take away: whether that be a proposal to improve a product, a conclusion from original research, or a record of a designer's efforts to create positive change in their community.

Thank you, and we hope you enjoy our first edition of the Texas Design Journal.

- Neil Potnis and Sean Feng

IMMERSE

FOOD INSECURITY AMONG COLLEGE STUDENTS

BY ROHIT DINESH

A majority of college students in America find themselves in situations of food insecurity. America is home to many world-acclaimed universities and colleges, and as of fall 2020, these institutions expect a total of 19.7 million students in attendance. Are institutions staying ahead of the curve when it comes to food insecurity?

The formal definition of food insecurity according to the USDA is a "state of being without reliable access to a sufficient quantity of affordable, nutritious food. (USDA, n.d.)" Despite its fairly straightforward wording, the solution to food insecurity is not unidimensional. In fact, food insecurity moonlights as an economic, socio-demographic, and logistic issue.

> A multifaceted problem requires a multifaceted solution

"A multifaceted problem requires a multifaceted solution," says William Ross, the current coordinator of the UT Outpost at UT Austin:

"When we think of [alleviating the effects of] food insecurity, it means:

- a student doesn't go to bed hungry,
- can choose nutritious food, and
- a decrease in the number of meals the average student skips daily."

UT Outpost is a community pantry that opened in 2017 as a response to the 28% increase in students with food-related needs in the few years prior (The University of Texas at Austin, n.d.). Recognizing the increasing prominence of students struggling due to food-related needs, UT, like many universities across the nation, set up food pantries for its students to obtain nutritious food for free. So who's eligible to shop at UT Outpost? Student shoppers merely need to be current students at the university enrolled in at least one credit hour! With virtually no restrictions on access to university food pantries, college students should be jumping at the opportunity for free food, right?

Following the breadcrumbs

To answer this question, it is important to look at some national trends. The #RealCollege survey is the nation's largest annual assessment of basic needs security among college students (The Hope Center, n.d.). Looking at data from 2018, 86,000 students from two and four-year universities across the nation participated in the survey, revealing some shocking findings:

- 45% of respondents were food insecure in the prior 30 days
- 56% of respondents were housing insecure in the previous year
- 17% of respondents were homeless in the previous year

45% of college students on average were found to be food insecure in the nation.

Table 1. Reasons food insecure students have not accessed the food pantry

Reason	N	%*
Others need it more than I do	138	30.1
Feel embarrassed asking for help accessing food	95	20.7
Don't know how to ask for help accessing food	58	12.6
I have regular adequate access to food	73	15.9
My time schedule conflicts with hours of pantry operation	45	9.8
Not interested/motivated to access food at the pantry	45	9.8
Don't have cooking equipment	27	5.9
Won't find any foods that I like	18	3.9
Don't have food preparation skills	13	2.8
Other	11	2.4
Foods won't support my special diet	10	2.2
Family doesn't want me to ask for help accessing food	9	2
Don't have transportation to get food home	9	2
Mobility problems getting to pantry	8	1.7
Foods won't support my religious beliefs	1	.2
Foods won't be culturally appropriate	0	0
Don't know how to get to the food pantry because of impaired vision	0	0

*percentages do not equal 100 because more than one option was recorded per participant

In a comprehensive 2018 intercollegiate study published by the Journal of Nutrition and Health Sciences, researchers were able to pinpoint some of the factors and causes that determine food insecurity at colleges in the US. Different colleges depending on size, wealth, and location showed differing levels of food insecurity (ap, 2018). The study elucidated that nationwide food insecurity ranged from "...14.8% at an urban university in Alabama to 59.0% at a rural university in Oregon." It was found that students of older age, identifying with a minor race/ethnic group, holding a job while studying, and having lower self-efficacy for cooking cost-effective and nutritious meals were more in danger of being food insecure.

Additionally, the report also highlighted the grim consequences students face due to food insecurity, among which were high rates of dropping out from college, increased risk of unhealthy mental health symptoms, and most importantly, lower GPAs and subsequent sub-optimal academic performances when compared to their food-secure peers.

Despite the clear correlations between low academic performance and food insecurity, an Appalachian State University study exploring the efficiencies of campus food pantries found that there were also perceptual factors that come into play in driving wedges between support resources and the students seeking them ("Use and Perceptions of a Campus Food Pantry Among Food Insecure College Students: An Exploratory Study from Appalachia," 2020).

Every college student that registered their response above was found to be food insecure, even the ones that felt secure in their food-related needs. It is clear that a way of combating the social stigma associated with seeking support for alleviating food-related needs is required. Like UT Outpost, many food pantries have embraced a boutique or market-style experience for their pantries to combat social stigma. Nevertheless, the problem persists. Universities are exploring more solutions towards getting rid of the mixed feelings and social inhibitions associated with seeking help.

Community pantries are a great way to alleviate food insecurity on college campuses. They tackle the economic aspect of food insecurity by bringing together supply and demand. Research shows that college students suffering from different levels of food insecurity have all benefited from frequenting a community pantry. Student testimonies claimed that such programs have helped them get the food they need while increasing their GPA and health, and minimizing stress.

Staying ahead of the curve

Prevention is better than a cure.

The number of victims suffering from food-related problems can be drastically reduced by adopting the principle of proactive prevention instead of reactive alleviation. This is why a preemptive effort into protecting and further increasing college food security is absolutely essential to stay ahead of the ebulliently increasing number of students burdened with food insecurity.

The past two decades have seen a drastic increase in college enrollment of students of color and from low-income families. Statistically, college applicants from these demographics attend the least-selective colleges and universities which may not have the resources to help students succeed, which subsequently snowballs into the larger problem of low graduation rates and suboptimal academic performance. Thus, it can be hypothesized that many universities are unable to find solutions for the novel challenge of accommodating and caring for students from lower-income families.

Will Ross, coordinator at the UT Outpost, remembers the stress of when the COVID-19 outbreak imposed new challenges on the program. "We took a unique response," details Will.

- Set up food delivery system for UT students near campus, using golf carts on lend from the UT Athletics Department
- Piggybacked UT Housing and Dining supplier contracts to increase inventory of regulated essentials, (beans, corn, hand sanitizers etc.)
- UT Athletics volunteered their community snack pantry

Within the span of two weeks, Will and the UT Outpost team put together a response system for UT students that fit the CDC guidelines of interaction. In fact, the delivery system proved a success for the entirety of summer 2020.

With the university running at a higher capacity during the fall semester, the home delivery system was switched to a contactless pickup system. The new system proved to be a major success. Comparing participation in the program as of October 2020 to that of October 2019, UT Outpost saw a 172% increase in program participation. All the while, the 'on-campus' population of students had almost halved from 55,000 to 28,000, signifying a booming increase in the number of people seeking support for food-related needs. "We face numerous challenges that require quick and novel solutions, but we anticipate growth," says Will, looking optimistically to the future.

Increasingly, American universities have begun laying the groundwork for prioritizing their students' food security. The College and University Food Bank Alliance (CUFBA) has become a major voice in the effort to alleviate food insecurity, hunger, and poverty among college university students. Partnering with other individuals and organizations running food pantries across America, CUFBA has garnered support from over 500 allied community pantries across the nation.

So what should be done?

Collecting data through optimized surveys would help paint a more accurate picture of food insecurity at any university (PMC, 2019). Furthermore, universities must take additional steps to combat stigma around seeking support. This could be done by adding seminars for incoming freshmen to improve knowledge about college resources, specifically the accessibility of collegiate community pantries. Universities could also attempt to bridge the gap between students in need and government food scholarship programs like the Supplemental Nutrition Assistance Program (SNAP), which has historically been underutilized by students.

This then leads to an important question: is it the responsibility of universities to acknowledge and alleviate food-related needs for their students? Is it the responsibility of the government? Tuition rates for the average undergraduate student have almost doubled from 1985 to 2018 (IES, 2019). Rates for peripheral costs, including housing and food, have increased as well. This leaves the average cost of attendance at about $64,000 for the average undergraduate in America as of 2019, and the trends only indicate increases going forward. Despite the plethora of scholarships and financial support available to students, financial alleviation is more a Band-Aid than a vaccine. True reform lies in the united effort by students and universities to consider a combination of multifaceted support programs to benefit the students in need and to propagate the importance of health and nutrition as a stepping stone towards overall academic and social progress.

USER PERSONAS IN *DESIGN THINKING*

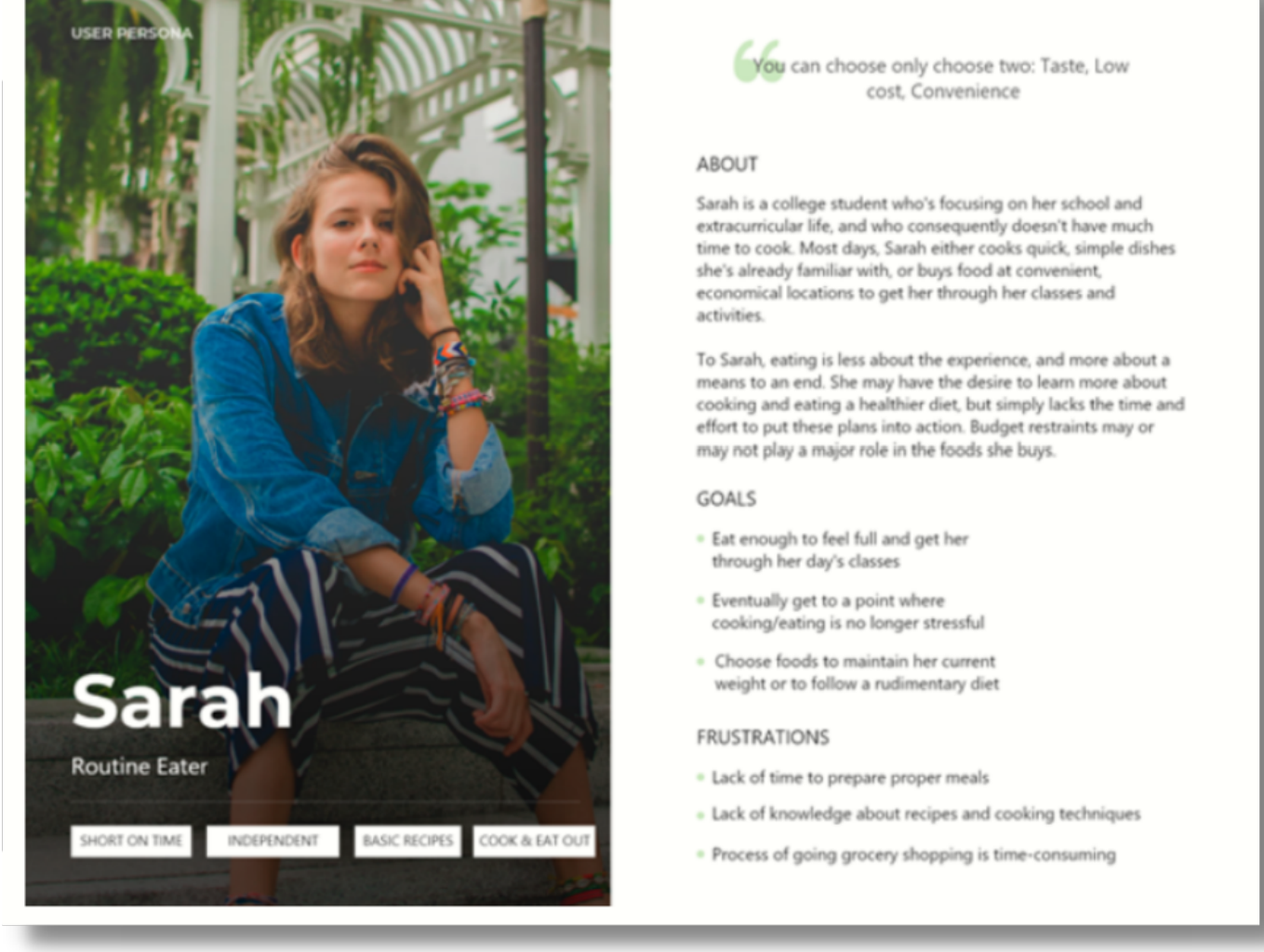
BY SEAN FENG

The Design Thinking process often leads to an abundance of research data. Reviewing this data can be an arduous process, and the empathetic side of research is often lost in the plethora of survey responses and interview logs. User personas offer a way out - a method of simultaneously encapsulating the research process's major outcomes and creating a relatable "user."

What is a User Persona?

Put simply, a user persona is a **fictional character** created by designers to represent the users they're designing for. This character is commonly the culmination of a design team's **ethnographic research**, and while user personas are usually not (and generally shouldn't be) based on any specific person, they should reflect the traits of distinct groups within the population of interest. Depending on the product being designed and its user base, multiple user personas can be created. User personas can have many different attributes depending on the depth and breadth of the research conducted; however, a good starting point is to consider the persona's characteristics, goals, and frustrations.

- **Characteristics** help to contextualize the persona and make them seem real and relatable. They include details such as age, gender, occupation, hobbies, and location. Characteristics can be derived from ethnographic research, or they may be completely fictional (and somewhat irrelevant) details thrown in to make the persona seem more "human" – like their favorite color.
- **Goals** are usually specific attributes based on research data. Goals define aspirations that the designer's end product can help fulfill.
- **Frustrations** are key attributes as they represent the persona's pain points. Since designers often design a product to improve a specific experience, it is necessary to uncover when in the experience users experience negative emotions; i.e., their pain points. A popular tool called a journey map tracks a user's emotions (including pain points) throughout this experience (also called a journey), so designers know what needs to be improved.
- A **quote** is a statement that distills the persona's archetype to a single short sentence. The quote can be completely made-up, or can be something mentioned by a respondent during ethnographic research. A good quote gives readers deeper insight into a persona's personality, and it should also complement their other attributes.



Why User Personas?

Ultimately, the goal of a user persona is to create a fictional "user" that can be the focal point of a designer's efforts as they progress through the Design Thinking process. This is why designers strive to create the most complete, accurate persona(s) they can, and why they may change the personas as new information emerges. The more accurate and detailed the persona, the more the end product will suit the needs of the target audience. By creating user personas, researchers can categorize their data (a step they were likely to take anyway) and turn it into a well-rounded package that is easily digestible by themselves and their stakeholders (Personas – A Simple Introduction, n.d.).

User Personas Applied - DFA UT Healthy Eating Project

My recent experience with using user personas was on the Healthy Eating project team of Design for America - UT. Our team conducted ethnographic research to get a better understanding of the eating habits of University of Texas students and what we could do to improve them. Personas were an integral part of our project, as they allowed us to aggregate our research to create three distinct personas: Sarah the routine eater (whose profile is shown above), Jonathan the dependent eater, and Lindsay the home chef.

Our team used data from several user interviews to create our user personas and to get a deeper understanding of our end users' thought processes.

After conducting surveys and interviews, our team noticed patterns in people with similar eating habits. For example, we found that students who lived on campus and ate at dining halls shared some traits with those who lived off campus and ate mostly frozen food or food they got from their parents. Both these groups were reliant on an outside source for their meals, so we created the persona of Jonathan based on their shared experience. By contrast, those who fell under Sarah's persona usually either cooked simple recipes for themselves or ate out at convenient locations.

Coming into this project, our team had a few misconceptions that needed to be cleared up. For example, we believed that a common experience shared by most students was grocery shopping, so we prematurely selected this as our target experience. This group of students also eventually served as the foundation for our first persona, Sarah. Creating user personas was instrumental to revealing the flaws in our initial assumption: as we interviewed more people, we realized many students got their food from other sources (like their parents or a non-UT dining hall). As other similarities emerged among this new group of students, our team decided to create a new persona (that of Jonathan) around them. Doing so allowed us to reframe our project, a process that resulted in a new target experience (a student's daily food journey) and a new target audience (only students under Sarah's persona).

User personas are a tool like any other. When used properly, they can benefit a project and reduce the amount of work a designer has to do. Here are some lessons our team learned over the course of using them:

1. D**on't make personas any more detailed than they have to be.** Adding extraneous details distracts from their core purpose, and more details means more chances for someone to get confused.
2. **Make sure personas are distinct.** While some shared characteristics may be acceptable (or even unavoidable), if two personas become too similar, it may become necessary to redefine the traits of at least one persona.
3. **Keep the project scope in mind.** After having developed our three personas in the Healthy Eating Project, my first instinct was to attempt to create a solution for all three. However, after re-evaluating our resources, our team settled on one persona, Sarah, towards which to focus our solution. Given the distinct nature of the various personas within a project, it will often be necessary to brainstorm a separate solution for each one.

IMPLICATIONS OF NFTS ON THE ART COMMUNITY

BY PARTH GHAWGHAWE

On March 11th, the sale of **Mike Winkelmann's (also known as Beeple) "The First 500 Days" for $69 million dollars** marked a historic turning point in the art world. The piece was sold by Christie's, a reputable and well-known auction house, as the first sale of an electronic graphic artwork the house had ever made - in this case, as a jpeg file. However, this jpeg file isn't an image that a user could simply take a screenshot of and own a copy of: it has a non-fungible token (NFT) attached to it to verify its authenticity.

What Are NFTs?

Non-fungible tokens can provide authenticity to original digital artwork. Since most digital media (images, audio, videos, etc.) is easily replicated, it is difficult to assign originality and ownership—and therefore value—to ordinary digital work. However, if an NFT is attached to a digital work , the authenticity of the file will be guaranteed, since no other file can have that particular NFT attached to it - even replicas made by copying the original file. Thus, by securing the uniqueness of digital files, **NFTs allow the artist to establish ownership** over an original digital work, just like one would physically own an authentic painting.

Unlike most physical artwork, which is generally bought and sold using cash or other traditional payment methods, NFTs have to be bought and sold using cryptocurrency. NFTs are minted and transferred through the blockchain which is an encrypted and decentralized way to store transactions and information. Simply put, information is time stamped, split up, and stored between everyone using the blockchain, making this system virtually unhackable. Whenever a transaction is made (cryptocurrency transfer), a unique code is created which stores the transaction and allows it to be verified. NFTs going through the blockchain system provide proof of ownership, the same way cryptocurrency transactions are recorded and conducted. This ensures that all transactions are secured and recorded, allowing anyone to trace their steps to the original owner using the blockchain (just like in physical artwork handoff records).

As cryptocurrency gains increasing importance in the digital world, people are becoming more familiar with blockchains and the process of purchasing digital currency. Since NFTs work on the same level as crypto, users may be more inclined to work with NFTs since they are already familiar with the concept. Also, since NFTs are often auctioned through public websites (some famous places being OpenSea, Decentraland, and Nifty Gateway), anyone who has access to cryptocurrency can also purchase artwork.

Some notable NFT artwork that has been sold so far include *hary* by Steve Aoki and Antoni Tudisco for $888,888.88, *Crossroads* and *The Complete MF Collection* by Beeple for $6.6 million and $777,777.77, respectively, and *Forever Rose* by Kevin Abosch for $1 million (Cascone, 2021).

The Shady Side of Selling Artwork

Collecting reputable artwork is not very straightforward in the art community. Art dealers such as Christie's and Gigosan are not obligated to sell any of the artwork on their walls, even if there is a price tag attached to them (Sussman, 2018). The business of galleries revolves around connections and established relationships with collectors, meaning that selling artwork to any person with the cash available is very uncommon - if not downright impossible. These obstacles make collecting art a very difficult industry to enter. In the end, there only remains a pool of about four dozen collectors who control most of the market.

Along with the monopoly of the high art market, the commercial art world also has its fair share of defects. In the past, digital artwork primarily used aids such as watermarks to "regulate" authenticity, but these anti-plagiarism measures often did not provide sufficient protection against e-theft. Once an artist lifts their watermark and sells their artwork, the buyer has complete control over the artwork since they own a copy. These files can easily be copy-pasted, which can result in the illegal distribution of paid artwork, often hurting the artist in the process.

Implications of NFTs

Before NFTs, electronic artwork was generally bound to graphic design for commercial and commission artwork. However, the authenticity and ownership that NFTs provide to digital files now allow artists to create and sell digital artwork in a much more secure manner. With the increasing accessibility of computers and the internet, **anyone can create digital artwork** with almost no restrictions (excluding software prices). With the unlimited number of NFTs that can be minted, anyone can attach one of these tokens to their artwork and sell it in a legitimate way. Thus, even creators who may be on a tight budget can create unique electronic artwork and sell it, allowing the art community to further expand its reach. In addition, anyone with money to pay for certain artwork is eligible to purchase them, no longer being bound by the skewed rules set by the high art community.

Since digital artwork is easily accessible due to minimal material prices, digital artwork can provide art accessibility to low-income communities or schools which may be on a tight budget. With the rise of NFTs and increasing support for the idea of digital art being "original" and "real" artwork, schools should integrate digital art into their curriculum. Integrating digital art into school curriculum would not only increase accessibility to art but also help reinforce the idea that digital art is "original art." With NFTs, the world of digital art has money to back "original" pieces, and introducing students to this field can be seen as a possible career opportunity. Finally, NFTs allow companies to copy sensitive documents, such as blueprints, without fear of theft. If NFTs were minted for the protection of electronic documents, including paperwork, virtual models, and company sensitive documents, businesses could make copies without fear of competitors stealing their ideas and information. If a rival company were to steal a document, NFTs would allow businesses to defend themselves for exclusive ownership over their ideas and documents in court. This protection can increase productivity of employees as well as protect company ideas.

With the introduction of NFTs, the world of electronic art has suddenly transformed into one where both authenticity and accessibility are available to everyone.

HUMANITARIAN AI AND VULNERABLE POPULATIONS

BY DEVINA PARIHAR

Artificial Intelligence (AI) is rapidly changing the world, but not always for the better. Vulnerable populations face the most risk in dealing with the harm and unintended consequences of AI. With a surge in AI-driven systems across the world, there has been an increase in the number of such systems being developed and used in humanitarian aid and disaster response. This increase in development further underscores the importance of understanding the implications of AI systems for vulnerable populations.

What is a Vulnerable Population?

The definition of a "vulnerable population" varies within the context it is being used. The NCBI takes a broad, research-oriented approach in defining the term "vulnerable population (Shivayogi, 2013)."

There are several definitions available for the term "vulnerable population", the words simply imply the disadvantaged sub-segment of the community requiring utmost care, specific ancillary considerations and augmented protections in research. The vulnerable individuals' freedom and capability to protect one-self from intended or inherent risks is variably abbreviated, from decreased freewill to inability to make informed choices. Vulnerable communities need assiduous attention during designing studies with unique recruitment considerations and quality scrutiny measurements of overall safety and efficacy strategies ensuing research. Ethical dilemmas are widely prevalent in research involving these populations with regard to communications, data privacy and therapeutic deliberations.

-NCBI

The previous definition touches on the ethical issues that commonly arise in research and product/service development when vulnerable populations are involved. A few concrete examples of vulnerable populations include those that experience disadvantages, discrimination, or suffering related to race, sexual orientation, gender, ethnicity, religion, and mental/physical health. An AI design framework based on human rights should be a necessity for all AI solutions - especially when vulnerable populations are involved. The considerations that go into such a framework may vary with the context usage of AI. Moving forward, this article will focus on designing humanitarian-oriented AI solutions specifically for vulnerable populations through posing a set of questions. The questions below are based on the UN-OCHA's Artificial Intelligence Principles for Vulnerable Populations - consider giving it a read-through for a more detailed understanding of how these principles were formed (Artificial Intelligence Principles for Vulnerable Populations in Humanitarian Contexts, 2020).

When Designing AI catered for people of a vulnerable population,

First and foremost, ask yourself...

- Why are we using AI?
- What are the implications of deploying an AI system in this environment?
- Would such an AI system exacerbate the risks for vulnerable people?

If it has been decided that an AI solution is best, ask yourself...

- Are we introducing initiatives for locals to be involved with AI?
- Do we have a long term engagement plan as well as an immediate engagement plan?

If you are working with a vulnerable population, members should feel empowered to understand, use, and vocalize feelings and concerns about the technology.

The ability to build trust between members of a vulnerable population, the design team, and the AI system is crucial. It is good practice to involve users in the design process of any system or service, and this holds especially true for members of a vulnerable population. A common initiative to increase engagement includes investing in capacity building (i.e. developing competencies and skills in an effective and sustainable manner). Capacity building allows for an organization, community, and individual to feel empowered to provide input when an AI system is being deployed in their respective community. To increase engagement throughout the development process, members of the community and vulnerable populations should be included in the design discussions from the beginning through post-deployment.

Remember - context is crucial, ask yourself...

- Are we designing in a socially aware manner?
- Have we spent time thoroughly understanding the local culture and climate?

AI systems, and technological solutions in general, are not solutions that work right out of the box. Designing AI goes beyond finding a “solution” - one also needs to understand the social and political climate and norms of the populations that the solution involves. Designers who leave the research and ideation phases too quickly often encounter the problem of “solutionism:”

As written in Mirca Madianou’s *"The Biometric Assemblage”*,

> “Solutionism is dangerous however when the need to come up with solutions to help people precedes thorough testing, including analyses of the local intricacies of the situation, which may not require AI systems at all (Madianou, 2019).”

Designers can introduce bias into their solution by not taking the time to fully understand the problem and its context, for example by unintentionally embedding Western norms into a system. A concrete example to consider is X2AI’s psychotherapy chatbot, Karim (Romeo, 2017). Karim’s purpose was to chat with Syrian refugees about mental health. A major issue that needed to be addressed when developing Karim was the introduction of potential biases to the system. Karim’s developers lived predominantly in the West, and had Western perspectives and assumptions about mental health and psychotherapy. Such assumptions could lead to many issues in future testing and deployment if the system’s eventual environment is not fully understood.

While checking for system gaps, ask yourself...

"*Have we conducted an algorithmic impact assessment and a third-party audit?"*

A third-party review and audit can be used to bring explainability to, what is more often than not, a black box system. Assessment and review can also help identify gaps and areas where biases, security risks, and data quality issues are prevalent. The issue of data quality is crucial in designing an AI system, and collecting quality data becomes an even more difficult task when gathering data for vulnerable populations.

Data sets for such populations are often inadequate, as certain groups may not produce recorded data to begin with. Such gaps lead to a lack of a “complete picture,” and introduce more biases from which these unrecorded groups suffer the most. Security risks of AI systems are harmful to everyone, but especially for members of a vulnerable population. For example, a breach of vulnerable populations’ data can lead to even greater risks of discrimination and harm. A third-party review can serve as a check to further assess such security risks, which may occur in various stages of the development process - from data collection to storage.

These are just a few of the many questions to be asking yourself when designing an AI solution, especially when working within a humanitarian context with vulnerable populations. In order to reduce the harm commonly inflicted upon vulnerable groups, consider going through this non-exhaustive series of questions with your team and local community members.

MAKING SENSE OF CHAOS

BY ESHNA PARIKH

Design research is a process of showcasing the form and function of a complex idea and organizing it to find clarity. To successfully carry out this process, many designers use an ideology stemming from the 1950s called Design Thinking, which attempts to scientize design and has been used to tackle problems ever since (The Interaction Design Foundation, 2020).

When undergoing the Design Thinking process, there are many elements to consider to achieve successful execution. To analyze and make sense of the data collected, designers use a tactful strategy called synthesis to organize their thoughts and insights.

What is synthesis?

Synthesis organizes, manipulates, cuts, and filters through data and statistics, generating a cohesive structure on which to build information and analyze findings. However, synthesis is not as concrete as it may seem, as it is more of a **cognitive and subjective process.** Designers often go through four paths when synthesizing: **data, information, knowledge, wisdom.** Using this method allows the designer to 1) *understand the data,* 2) *experience elements of the information,* and 3) *take a deeper look and empathize with the concept*. Therefore, synthesis is crucial in the design process because it sets up the architecture for an effective solution. Additionally, it helps connect outside data to the personalized connections created through analysis.

Sensemaking

Hoffman, Klein, and Moon define sensemaking as “a motivated, continuous effort to understand connections, which can be among people, places, and events, to anticipate their trajectories and act effectively. (Intelligent Systems, 2006)” This concept builds upon the focus of synthesis and dives into the action-oriented process that individuals innately go through in order to integrate experiences into their understanding of the world around them.

When there is chaos, the human instinct is to make sense of the situation. This is where synthesis becomes a very important asset in the Design Thinking process. **Sensemaking**, or piecing together a puzzle of information, essentially develops an idea. The purpose of sensemaking is twofold: it allows synthesis to be more detailed and organized as you form relationships between data and ideas, and it allows you to better understand your own train of thought. Breaking down the synthesis stage into a few easy, practical steps streamlines the process of ideation, the creation of a legitimate design, and the testing of prototypes.

Additionally**,** designers undergo a **user research phase** where they will collect hundreds if not thousands of verbal transcripts, pictures, and artifacts in order to "make sense" of the problem at hand. Comprehension of data is extremely important to the designer to identify and forge connections as data will frequently turn into a hodgepodge of various thoughts that, at the moment, do not have a straightforward relationship and coherence. Therefore, designers will spend hours making sense of their onsite research, and make "real" and "whole," what once was chaos.

Steps of Synthesis

To fully understand and execute the synthesis process and truly make sense of data, it is essential to learn and master the steps behind it, providing a better grasp of your research from multiple perspectives. Synthesis cultivates three key ideas when progressing through each stage: *prioritization, perception, and forging connections.* The next few paragraphs will walk you through synthesis and enhance your design process, creating the perfect environment for creativity and innovation.

Understanding The Data

In order to take a large quantity of data and condense it into a simple design problem, designers often externalize their data through **spatialization**. Spatialization is the process of clustering substantial amounts of information.

By externalizing the data, the chaos is reduced into information that the designer can use to make explicit and implicit relationships.

- **Explicit**: What was clearly stated by those surveyed
- **Implicit**: What the designer implies about those surveyed

The most common tools used for spatialization consist of a large wall, a marker, and many sticky notes.

By spreading out their thoughts physically, **designers can internalize the data through external actions**. Combining the physical action of writing on a sticky note with the mental process of thinking about the data causes the designer to subconsciously evaluate and order the information. Scientific research has proven that writing thoughts down creates tangible pieces of knowledge that make contextualizing easier (Wax, 2018). Therefore, writing data onto sticky notes groups the data and allows for inferences.

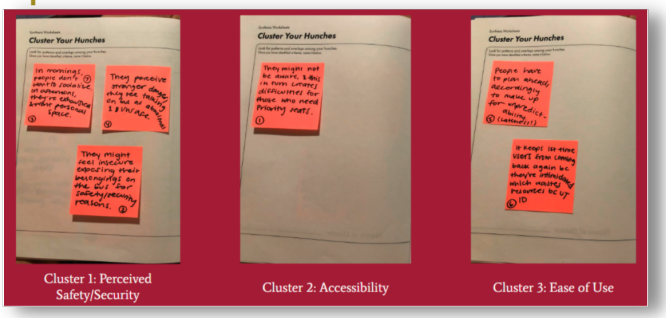
For the purpose of this exercise, we will take a study done at The University of Texas at Austin's Integrated Design introduction course as an example. The purpose of the project was to improve the user experience on a public bus. Every project will have a rife number of sticky notes, but in order to make this information effective and valuable, it is important to include every single observation and data point.

Below are a few examples of what these initial thoughts may look like:

- "Mornings: people pretend to sleep, don't want to socialize"
- "Afternoons: people are actually asleep, exhausted and want personal space"
- "People got rattled when strangers approach/ talk to you"
- "People sit in the priority seating w/o needing it or reading the sign"

After posting the sticky notes onto a wall, the next step is to make sense of the scattered information. Designers begin to physically move the sticky notes and place them in groups of commonality. These groups, called clusters, are organized around a set of themes. Being able to rearrange and find multi-faceted connections allows for a deeper understanding of the problem. Connections create order, allowing the designer to get a complete idea of the data on the board. Discovering links within the data places the designer in the shoes of the user, and lets the designer draw conclusions to use in ideation.

Experience Elements of the Information



Although collecting and organizing information can give the designer better ideas about the aforementioned relationships, the true process of synthesis doesn't begin until links between data are created. The designer must take his/her research and develop a set of point of view statements to convert research and data into actionable information. Point of view statements are a set of thoughts that describe the target audience, including the person's decisions, behaviors, and motivations. It is also important to get a deeper understanding by noting down data points or clusters that stood out. Lastly, designers often collect data and research through interviews. It is crucial to consider three to five of the most powerful quotes that were heard and analyze them as well.

Below are examples of point of view statements for the clusters mentioned above:

Cluster 1 (Perceived Safety/Security): "People might feel insecure leaving belongings exposed due to the lack of safety on a bus. Bus riders don't normally talk on the bus because they are fearful of their surroundings and because of 'stranger danger.'"

Cluster 2 (Accessibility): "When people do not follow the rules and signs for accommodations made for people with disabilities, it clearly restricts those individuals who truly need access. Some people are not even conscious of the priority seats and are unaware of the guidelines."

Cluster 3 (Ease of Use): "Because of the unpredictability of bus schedules and bus stops, new users might be intimidated by the system as they are on a tight schedule and there are no rules or guidance through the experience. For students who get a free bus pass through their ID, end up reducing their use of the bus due to the inaccuracy and amount of planning that has to go into the trip, causing lateness for commuters."

After constructing the point of view statements, the next step is to convert the observations into insightful ideas. It is not important to be right or wrong in this process - it is more useful to consider hunches about the meanings behind clusters. In Design Thinking, a hunch is what the point of view statement means and why it matters. Similar to how the data was split into themes across clusters, the next step is to take the hunches and sort them into clusters with the category or overarching theme. This allows the designer to see the bigger picture and make problem-solving easier.

Take a Deeper Look and Empathize with the Concept

Traditional methods of design struggle with chaotic issues. For this reason, designers have adopted the **affinity diagram,** which pieces together all the sticky notes and observations through natural relationships.

After developing themes through the clusters and relational hunches, a designer must expand his/her themes. A one-word title is not sufficient to produce a viable solution. Therefore, every theme must be converted into three brief **insight statements,** similar to a news headline, which can include the Who, What, When, Where, Why, or How of the topic. Below are some examples of insight statements from themes used to analyze the user experience on a public bus:

- **Practicality:** "The unpredictability of buses causes a level of unnecessary stress for users and forces them to allow extra time to ride it"
- **Accessibility:** "Having to disclose a disability to a stranger on the bus just to sit down can be uncomfortable"
- **Safety:** "Bus riders' level of perceived security varies based on the time of day as well as with whether they are alone"

As demonstrated above, insights are specific, one-sentence statements that summarize the problem at hand. Keeping these statements short and to the point helps derive action-oriented thoughts and ideas. By providing a description of the theme, the human-centered point of view is combined with the theme's broad nature, an essential step that enables the entire design process.

Most importantly, when writing these insightful statements, the designer must be sure to get rid of any biases.

The final step in the synthesis process is the integration of thoughts and insights into cohesive action statements. These "how might we" statements are a call to action, taking the project from the define phase to the ideation phase.

“How might we...?”

is not an arbitrary phrase, but rather a structured question that prompts the designer to stay away from statements like:

- “Why don’t we?”
- “I think you should...”
- “We must...”

How might we questions have three parts:

How: signifies taking action to implement something
Might: gives room for possibility or change in thought
We: demonstrates a collaborative effort and impact on the public

It is important to keep the phrase’s structure to effectively complete synthesis and smoothly transition into the ideation and action phase.

Below are a few how might we statements that were created based on the prior examples:

- “How might we create a better experience for UT students while using the bus system?”
- “How might we increase communication between navigation apps and the bus system?”
- “How might we support differently-abled people to make their bus rides more convenient and comfortable?”
- “How might we improve inner bus signage so that riders know things like where priority seating is?”
- “How might we empower students to use the bus system to get to know Austin better and feel more confident in public transportation?”

The Transition

Since the synthesis stage consists purely of analyzing and sensemaking, there is a need to create an end goal from the “how might we” statements and transition into the prototyping phase. As a designer, it is crucial to forge ties between these statements of concern and find avenues for a viable solution. During the transition, the designer must narrow down the “how might we” statements into one “how might we” question that they want to continue with. After undergoing the steps of synthesis, the designer will have a concrete idea of what they have observed and can find a common theme that was seen as the most pressing and accessible issue.

In the Austin Bus System project at UT, students realized that there was a clear issue from their research that was feasible. Accessibility was a theme that stood out because of the first-hand observations and interactions that were made during the user research phase, and it became the focus of the study. Finally, the “how might we” statements created in the previous phases were narrowed down to one statement to be used for the rest of the process.

"*How might we* educate other riders about priority seating, so that people with disabilities can easily access it?”

Narrowing down the questions to one final statement segues the designer into the prototyping phase with a clear direction on what their design is trying to accomplish.

So, Why Use Synthesis?

Following these steps gives the designer a sense of comfort with their data. For instance, in the first step **(understanding the data)**, a messy, complex problem is distilled to its root issues. The designer can focus on the data that was collected and can feel at ease when exploring the problem’s possible causes.

Since the Design Thinking process is creative in nature, it takes externally-gathered data and turns it into workable information that can be used to generate ideas. Synthesis develops a framework for the interpretation and modeling of externalities and allows the designer to feel more capable, confident, and reflective of their research. By examining relationships between information, designers are allowed to truly learn and experience the data, improving their intuition of the research, and building expertise to solve design problems more effortlessly and empathetically.

Furthermore, the design of a product is always changing as new realizations come to light and new functionalities are brought to fruition, meaning the framework of how designers go about problem-solving will inevitably change. Taking a deeper look into the problem at hand and understanding the user’s perspective through empathy lets designers put the pieces of the puzzle together. Empathy is crucial here because removing biases and connecting with the end-user can greatly enhance the designer’s problem-solving and prototyping abilities.

Designers tend to make sense of complicated thoughts and ideas physically (hands-on), rather than reflecting upon them from afar. Through synthesis, the designer is able to learn, understand, and react to the needs of the problem, finally making sense of the chaos and coming closer to acting on the problem. In the end, without synthesis, there could be no gallant effort to produce knowledge from information and truly drive innovation.

STUDENT EXPERIENCES IN DESIGN
MARTHA CZERNUSZENKO

BY TANVI SHAH

Through Texas Design Journal, I want to highlight how broad the design experience is through student testaments. Introducing Martha Czernuszenko, one of the first people to introduce me to design.

Tanvi: Introduce yourself!

Martha: Hi, happy to be here! I graduated in May 2020 with a double major in Management Information Systems and Business Honors, with Certificates in Design Strategies, Entrepreneurship, and Computer Science. I spent two summers at Apple (Design Operations & Business Analytics), worked in the social good space mentoring for Kode With Klossy, interned for AI Global, and researched for the Gates Foundation through the University of Virginia's Data Science for Public Good program.

Tanvi: Very impressive! But with so many different experiences, what was the central theme that really tied everything together?

Martha: Thank you! I would say that all of my classes and work experiences look at how to use data to tell stories to drive business and societal change, and I am very grateful to have had the opportunity to do that in various mediums.

Tanvi: How did design impact this?

Martha: Design helps shape these stories and understand which change to pursue. When shaping these stories, I think back on the Dean of Design, Doreen Lorenzo's, advice, "design is leaving breadcrumbs for the user." Design is the starting point for any user journey; whether it's building out a product or an experience, design tools and strategies allow us to build out a more effective solution that enables change. Even in "non-traditional" design settings such as data science, the best code is not always implemented; rather, it is code that focuses on what is important to the stakeholder (such as the Project Lead or End Customer) that is chosen.

Tanvi: Interesting. How did you develop this thought process and what would you say is the most important aspect to remember when thinking of a solution?

Martha: The design classes I took and the experiences I had really solidified the idea that user empathy is essential to the process of fleshing out a product. It is also extremely important to be open-minded when you take on a project, something that design classes definitely helped me develop. Always consider edge cases, scalability for your solution, and most importantly, the human problem you are trying to solve.

Tanvi: So you were one of the first people to sign up for the Design Strategies Certificate?

Martha: Yeah! The program started out relatively small but has been gaining traction in the past couple of years. The inaugural graduating class had around seven people and our class had around twenty. However, you do not have to be a part of the certificate program to take the classes - lots of people take a few classes that blend well with their interests!

Tanvi: Why the Design Strategies Certificate?

Martha: To be honest, I took my first design class, Design for AI, on a whim. My counselor recommended the class to me as an elective, but I ended up joining the certificate because I loved that class. I think what really spiraled me into the design world was the variety; I got to interact with a range of professors who had various experiences from startups to design studios which translated into different perspectives.

Tanvi: Are students typically from a certain major?

Martha: Not at all! Design is applicable to any field. I met a variety of people with different majors in my classes, ranging from Anthropology to Asian Studies to Engineering to Business.

Tanvi: So with such a range of students and professors, what is a consistent trait that you would say makes a person successful in the design world?

Martha: Having a very open mindset is crucial, but I would also say a curiosity to delve deeper into topics and knowing when to stop. For simplification, understanding which rabbit hole to go down and how far.

Tanvi: Finally, a field that endorses rabbit holes. What is something that you have picked up from design?

Martha: I definitely developed a mindset of prototyping and getting feedback on my projects early on. In the business and technology space, people often want to fully flesh out an idea before they even talk to any users. Not only does this waste time and effort, but it also gives very little space for feedback. It is really important to know when to start iterating on different features in your product, especially because it is very easy to deviate from what the user wants. The prototyping process works well for justifying my solutions to the teams I worked with since I am supported by user feedback, engagement, analytics, and other elements of the UX process.

Tanvi: You've definitely emphasized user engagement. Why is it so important and when should we be cautious?

Martha: Solutions will not work unless you talk to users. You will need to prioritize action items that are user-focused, and this is essential for good long-term business planning. In terms of cautiousness, I usually check my "BS Meter." Users tend to tell you what they want you to hear rather than what is true. Professor Garmon brought up a great study where a designer asked someone how they open a medicine bottle. They answered the question by stating that it was a simple process of twisting the cap open. However, when they were asked to actually open the bottle, they used a bread slicer!

Tanvi: A bread slicer?!

Martha: We are all guilty of doing this at some point. For example, users might claim they are eating healthy, but the junk food in their trash tells us a completely different story.

Tanvi: That one hits a bit close to home. What is your favorite thing that you have learned about or been introduced to in Design classes?

Martha: I really like the "How can we..." statements since they are a really nice way of framing ambiguous problems. The first step is trying to make the problem statement as simple and consolidated as possible, and in order to do this, it is important to ask yourself, "can your grandmother understand it?"

Tanvi: I like that! I am quoting it.

Martha: This idea is very applicable to problem-solving, especially in research culture. I spent the past three months working in academia and one of the biggest opportunities that I saw in research culture was to shift the narrative of presenting information in a complex way to a simplistic form, especially for those who do not have domain expertise. How is research going to help societies if people cannot understand it? This is obviously very difficult to do because at times, the problems we are looking to solve involve how qualitative information like policies can be converted into quantitative solutions. Explaining the process to non-experts can be especially daunting.

Tanvi: How have you used design strategies when it comes to turning something abstract into a concrete idea?

Martha: Turning vague information into concrete solutions is a pretty consistent method across all the fields I have worked in, whether it was projects at Apple or at AI Global. With the Gates Foundation Case specifically, we were analyzing an extremely broad problem of economic mobility in states like Virginia and Oregon and needed to figure out how qualitative information like policies can be converted into quantitative composite indicators.

Tanvi: Can you walk me through the design process for the Advancing Economic Mobility Project funded by the Gates Foundation?

Martha: Sure! We started out with a literature review to understand the landscape of economic mobility as well as to identify various frameworks. We went with Flora and Flora's Community Capitals Framework and defined the scope of the project by analyzing one of the community capitals: Political Capital. After conducting some research in policies, we started getting feedback on our solutions from domain experts in the field. I was analyzing education policies, and since I am not an educator or government official myself, it was vital for me to get opinions from field experts. Being able to empathize and letting someone tell you "how to walk a mile in their shoes" is a skill I've definitely strengthened from my Design Strategies classes, and it changed the way I work through the problem-solving process. Definitely talk to your end-users, but also involve others in the design process. Try integrating subject-matter experts into your problem-solving process when you are prototyping and getting that user feedback. With this external insight, our team then started visualizing our results, quantifying our policies, and we finally developed an application for community members to explore the state of policies.

Tanvi: Moving a little bit away from the project here, what was your initial impression of design?

Martha: Sadly, I succumbed to the preconceived idea that design was all about "making things look pretty" and that it maybe extended out to branding. But design is so much more than that. *It's the secret sauce for great execution*.

Tanvi: I really like that! I am definitely writing that down as a quote. What has been your favorite class as a part of the certificate program?

Martha: I would say it's a tie between the Ethics of AI and Women in Entrepreneurship. With Ethics of AI, I realized how important design is to the technical process. Here, design isn't just designing for power users, it's designing for fair and equitable user experiences. We really stressed moral issues in comparison to edge cases as well; one of the cases that we looked at in Ethics of AI was a self-driving car and the risks of it being hijacked, including creating a fake stop sign to disrupt traffic. I learned about the impact of considering responsibility as a part of the design process.

Tanvi: What about design in entrepreneurship?

Martha: Design is integral in entrepreneurship, especially early on, because it enables you to develop for the user and identify where to focus. After talking to classmates whose full-time roles were delayed or canceled because of COVID-19, I realized that while some people were looking for internships, others were looking to volunteer or even to make wine. I bootstrapped Short-Term Opportunities, a website that uses Google Analytics to iterate based on users' experiences. The website was a success! It has been accessed by thousands of users in 1,200+ cities and I would largely attribute this to the design steps that were taken before: talking with users and solving a problem. For example, an interesting metric that I noticed is that most people look for jobs on Sundays, and data like this helps me figure out how I can improve my website.

Tanvi: That is so interesting! Besides your side projects, what has been your favorite design project?

Martha: My Design Capstone class this past semester worked with Planet Texas 2050 to make climate change data and research more applicable to the daily lives of Texans (Planet Texas 2050, n.d.). My group focused on giving recommendations from a data and technology perspective, so we looked at technologies that could be used for data interpretation. We talked to over 25 people from the TACC, Planet Texas 2050 researchers, journalists, and the local Austin community to learn about how they access climate change information. We were able to identify an opportunity to connect Texans to research, so we essentially needed to figure out a way to make it easy to understand and drive value at the same time.

We came up with a brand, Climate Bites, which featured various products such as Climate Bites for Tots. Climate Bites for Tots is a video series where we had small kids ask researchers questions about their research. After getting a prototype, we were able to iterate from user feedback and started completing user journey maps to guide this experience. We then laid out several touchpoints and the differences in the level of engagement between researchers and the general Texan public. In the end, we provided a tangible solution with an implementation plan and brand guides to translate and communicate scientific research to make it applicable to the daily lives of Texans.

Tanvi: Any last pieces of design advice?

Martha: Prototype - get something out there and get feedback!

Key Takeaways:

- Design classes are not boxed into one field, category, or industry! Martha's focus has largely been on technology and public policy-related industries, as she uses data to drive societal change. Her use of design is integrated with her approach and problem-solving aptitude.
- Design is an inherent part of problem-solving. Here are some key strategies to keep in mind:
- Simplify the problem at hand! This not only allows you, the designer, to better understand the issue but also allows you to better understand what the user wants.
- Prototype, prototype, prototype! If you want to measure the success of your solution, ask the people who are going to use it in the future.
- Engage with users carefully. Do not forget about the BS meter - users do not necessarily know what they want and do not want, but it is your job to observe the process they use to get from Point A to Point B and understand their pain points.

Design is everywhere - Side projects, classes, and the industry!

INSTRUCTIONAL DESIGN

BY RIYA SOLANKI

Necessity is the mother of invention – especially if that "necessity" is a global pandemic. The COVID-19 era has forced the world to stop and rethink everything from the economy to entertainment. One of the biggest issues we face centers on how schools will resume this fall. How does design fit into solving problems of such a massive scale?

The fall semester of 2020 saw the largest-ever rollout of structural change in the American educational system. Most universities have determined that back-to-school "as usual" is impossible given the current situation. Instead, schools are going virtual, and students across the country will have to adjust to what could be the new normal. Despite the general consensus that this is the safest way for students to continue their education this fall, the prospect of long-term online instruction introduces many valid concerns. Students wonder if they will receive a quality education, if they can and should be paying full tuition, and whether their schools will accommodate personal circumstances that are out of their control. Faculty and administration also face daunting obstacles that are often overlooked.

Although it may be considered optimistic, I believe that the pandemic – from an educational perspective – can be an opportunity to reconsider the structure of the current system and identify areas of improvement. Which aspects of higher education helped students in the past, and which ones hurt them? How have our values shifted since the pandemic began? What does the "new normal" even look like? If we are asking ourselves these questions, we could use their answers to improve schools for the long-term. This is where instructional design comes in.

A Background on Instructional Design

Design used to be viewed as a discipline. It was a process limited to creating tangible products and spaces, and designers were the "artists" of the real world. However, people have recently seen design for what it can truly be: a human-centered paradigm for solving all kinds of problems (Luka, 2014).

Instructional design (ID) or educational design is a process that consists of planning, creating, implementing, and evaluating methods of teaching and learning. The actual act of learning in school is a synthesis of many moving parts: curriculum, tasks, spatial layout, technology, lecture style, and more. All of these elements are designed to work together and help students absorb the concepts of the course.

It is easy to oversimplify the meaning of instructional design to just "designing an education." Something as broad, dynamic, and personal as education could never be designed, manufactured, and used the way a tangible product could (Speicher, 2019). Classroom environments are "complex, dynamic, and somewhat unpredictable" and consist of epistemic, physical, and social interactions (CoAction, 2013). Instructional designers are constantly building on existing infrastructure, realigning priorities as student needs change, and finding ways to address those needs.

How are our goals and priorities for education shifting?

Professor Clint Tuttle is a lecturer in the McCombs School of Business and has been part of the team that is guiding faculty through the transition to online/hybrid models at the University of Texas at Austin (UT Austin). He echoes the sentiments of many policy makers and educators globally, stating that the pandemic highlights the inequities students face and the degree to which personal circumstances affect their learning.

After students were sent back to their hometowns in March, many shared their situations with their professors. Some had limited access to technology or lacked an internet connection, some were facing financial troubles, and others were unable to take exams without distractions due to a lack of space. The list goes on and on. Professors were also juggling challenges as many had to work while caring for their young children or elderly family members full time. Professor Tuttle says this semester is going to be about empathy for everyone – students, instructors, and administration

Design Questions

Once we have established the core values of this "redefined" education system, we can begin to ask questions and propose measures regarding how these values will be acted on. Since the pandemic, many universities have hired instructional designers to collaborate with faculty on this task. At UT Austin, for example, the Faculty Innovation Center (FIC) worked with experienced online lecturers and instructional designers to create resources for professors on virtual instruction.

Here are some of the questions that have been raised:

- Do we assess students for the participation and effort they put into their classes, and how does it weigh into their overall success in the course?
- How do we monitor academic honesty and fairness when students aren't in the classroom?
- How can we foster a positive student-teacher dynamic online?
- How can we accommodate for various learning styles and challenges that students face?
- How do we adjust for the fact that students' attention spans often decrease when they are not in the classroom physically?

Proposed Measures

In response to some of these questions and more – and keeping a focus on empathy – we can propose some strategies that could be implemented to varying degrees depending on the size of the class, the resources available, etc. Here are some common ones related to online instruction.

- Divide the course into parts so that students are responsible for less material at a time and are assessed on it more frequently (this also gives students more opportunities to do well in the course because they get more feedback on their assigned coursework)
- Modify course schedules and guidelines so that students can work at their own pace when unforeseen situations arise
- Make lectures and outlines available after the class session so that students can revisit areas of confusion
- Use a "flipped" model to use class time for student-teacher interaction, discussion, and practice
- Make an effort to connect with students on a personal level; "humanize" professors so that they seem less intimidating and more approachable
- Set clear and achievable expectations so that students develop resiliency for the course load and difficulty
- Make exams open note (this can also help students focus on grasping concepts and applications rather than memorization) (Schein, 2019)
- Use web conferencing features to create small discussion groups
- Have students teach each other concepts in the unit
- Use online tools to give automatic feedback and personalize practice questions

Design vs. Implementation

When it comes to any kind of product-service system or experience, a good design proposition alone is not enough. Design has an indirect effect on learning. Even if a curriculum is perfect in theory, its success largely depends on its execution. Students are just as much architects of their own education as teachers, and although a student's motivation and personal circumstances are outside the scope of what can be "designed," their buy-in is crucial to their experience (Morelli, 2002). Especially in the realm of instruction, "attention has to shift to the necessary conditions that must be satisfied if there is to be any significant chance of enacting designs in ways that really integrate good pedagogy and innovative technology" (CoAction, 2013). When a school sets out to use this time of online transition to not just maintain but to improve its quality of education, it can create an environment where virtual resources serve as an asset rather than a fallback.

Concluding Thoughts

Design theory values iterative ideation and constant feedback. It is uniquely suited to view complex problems through a human-centered lens. These qualities make design a powerful method in approaching the challenges we face in education today, particularly with the transition to online instruction.

The COVID-19 pandemic forces us to challenge the status quo in every aspect of our lives. We are now rethinking everything we do and have been given the chance to evaluate what needs change. Empathy, accessibility, and accommodation are going to be at the forefront of the next wave of pedagogical theory, and design research is perfect for this approach. By combining instructional design, human-centered policy, and support for faculty and students, this online semester can serve as a model for better education for all going forward.

A special thanks to Professor Clint Tuttle for taking the time to share his experiences and knowledge with me on this subject.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IMAGINING THE WORLD OF ENGINEERING *IN COLOR*

BY WIS ESCHER

> Symmetry signifies rest and binding, asymmetry motion and loosening, the one order and law, the other arbitrariness and accident, the one formal rigidity and constraint, the other life, play and freedom.
> *- Dagobert Frey*

The journey begins with exploring the parallels between the worlds of art, engineering, and design.

Art vs Design

Art: Expressive approach to human sensory experiences

Design: Purposeful approach to solving human problems

Art is applied in design to expand the experience of the problem being solved. It lives in a world of human emotions and appreciation of the power of beauty and aesthetics, yet has intrinsic value. Design expresses the purpose of offering solutions to human problems, appreciating the needs and extrinsic value of what serves the user. There is a sense of ambiguity versus simplification; design alleviates challenges while art implores them. This being said, there are design outcomes that utilize art for appealing visuals and aesthetic implications to enrich a user's expression, or deliberately solving a design problem where the purpose stresses an aesthetic need.

Engineering vs Design

Engineering: Technical approach to solving a problem

Design: Human approach to solving a problem

While Both disciplines are collaborative fields that solve world and human problems in relation to the artificial world, engineering is traditionally problem-centered and design is human or need-centered. These two disciplines can merge to apply technical and user-oriented solutions for the most efficient outcome as the world we design becomes more focused on the experience of the user.

Having designers enter the world of science to communicate scientific information leverages various modes of expression.

In other words, color applied to visual and layout design allows the world of engineering to come to life.

I explored this approach when designing the user experience and user interface for TREL's (Texas Rocket Engineering Lab) website, a student-led rocket engineering group at the University of Texas at Austin (Texas Rocket Engineering Lab, n.d.). The website aims to:

1. Visualize engineering machines so that they are appealing to the human eye
2. Introduce Aerospace-related artistic elements
3. Breathe life into Aerospace

While keeping in mind web accessibility guidelines in the context of the color scheme and contrast, such as where text is easier to read if the text and background colors are contrasting.

To experiment with color, we created an affinity diagram with four categories: Pop, Modern, Realistic, and Fantasy, placing images that reflect different color spectrums on the diagram to gauge the tone of the website as well as each color's feasibility within TREL's brand.

- To the engineers, TREL is a modern and realistic aerospace brand with a clean and two-tone color palette of black and white–and a gradient sky blue.
- To its audience, TREL is adventurous and innovative as well as engaging and inspiring for younger generations.
- To the sponsors, TREL is diverse, informative, and collaborative, with the mission of advancing aerospace.

All of the stakeholders above embody TREL's user base. TREL's long-term goal is to demystify the intricacies of applied rocket science. We approached this by adding elements of unexpected colors into the TREL brand to diversify the vision of what engineering looks like. We explored various color gradients to incorporate more than one color and represent the fusion of art and engineering.

Applying color theory,

- **Red** is used to portray excitement and passion on the bright spectrum, and darker hues portray leadership and courage.
- **Orange** is used to portray creativity, adventure, and youthfulness, as well as stimulation, adventure, and enthusiasm.
- **Blue** is used to portray the depth of the sky, and is associated with intuition, imagination, inspiration, and open space.
- **Beige** is used to portray naturalness, dependability, flexibility. It signifies comforting environments, and works well with coordination in regard to order/symmetry.
- **Black** is used to portray power, authority, formality, and elegance, as well as sophistication.

These colors give depth and variation to the visual elements of design and the overall website experience. We intend to prototype various combinations of colors and test them with our users to see what design aesthetic reflects TREL and to guide the launch of the website phases to view the design live.

After referencing the study eBay did on redesigning the user experience of evolving color, we became aware of the unexpected effects of:

a) making a traditional product untraditional through color
b) modifying an existing brand with a drastic change in color and visual elements

We are also exploring the method of subtly changing the design with an algorithm "that fade(s) the background color - one shade at a time over a period of several months," following eBay's example where they redesigned their interface from yellow to white progressively as it was not received well initially (Tenhue, 2017). In eBay's case, "...none of the users noticed this change" once it was implemented over time, demonstrating how a transition of brand expression can be more comfortably applied in phases.

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LIGHT THE WAY: DIVERGENT & CONVERGENT THINKING

BY IVY LEE

As product designers, we see a problem and automatically think to fix it. After all, we are problem solvers before we are visual artists. We innovate within the context of a problem. We're not called to complete simple paint jobs; product designers must paint around context, navigating in and out of the canvas.

The first solution that designers think of is never the last. Designers use processes called **divergent** and **convergent** thinking to creatively generate ideas and strategically narrow them down. Proposed by psychologist JP Guilford in 1950, these thought processes require flexibility of thinking and are used during the ideation step of **design thinking** (Custom Writing Services, 2017).

Clearly put, here are the definitions* of each (Boogaard, 2018):

- **Divergent Thinking:** the process of coming up with new ideas and possibilities—without judgment, without analysis, without discussion
- **Convergent Thinking:** the process of taking a lot of ideas and sorting them, evaluating them, analyzing the pros and cons, and making decisions

**defined by Anne Manning, Founding Partner of Drumcircle LLC and Instructor at Harvard University*

Divergent Thinking

Divergent thinking allows for wild, broad, and creative ideas because the facilitator is able to lead an open brainstorming session. Divergent thinking focuses on quantity over quality, as the goal is to generate as many ideas as possible in a short amount of time. ***The key here is to ensure that everyone feels safe and comfortable about sharing their ideas.*** By creating a "no judgment" space, designers, engineers, product managers, and even stakeholders can immerse themselves in the problem and contribute during the ideation process. This is a cross-team effort and regardless of different titles, everyone is engaged and working towards a common goal.

> **It is the type of thinking that allows you to go big (Boogaard, 2018).**

Convergent Thinking

On the other hand, convergent thinking requires product designers to collaborate and narrow down ideas using a set of given criteria. A team will consider business goals and technical constraints to weed out solutions that aren't feasible at the moment or do not truly suit the user's needs.

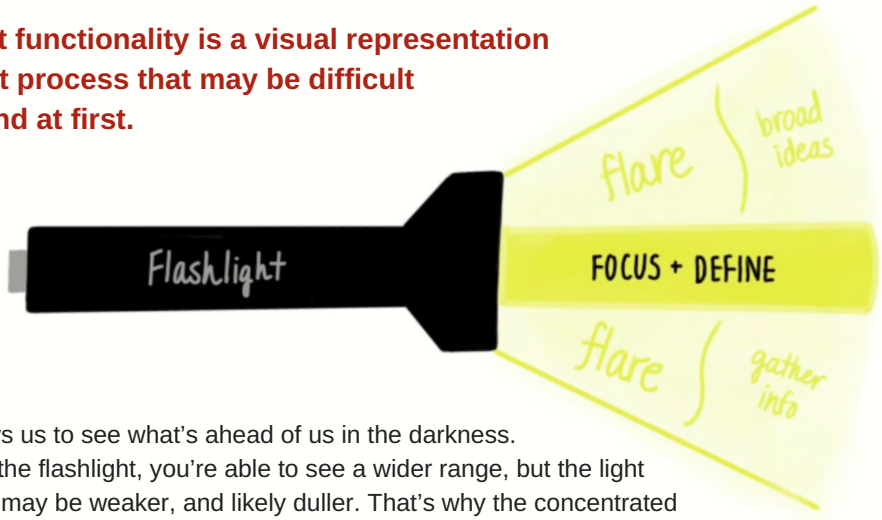
After compiling all of the team's ideas, one way to filter those ideas is to organize them into categories or themes. In doing so, designers can collaborate to identify common threads. The team will gauge which ideas stand out, which ones can be eliminated, and which ones are similar and can be grouped. In the past, my project teammates and I have voted on ideas that were "most practical," "most interesting," and "most innovative" to make decisions on which idea(s) to move forward with.

Convergent thinking has also helped me learn how to compromise within a group setting, as well as how to advocate for my ideas and design decisions. Like I mentioned earlier, some ideas can be combined to create better ones—that's just the nature of great design.

Flare and Focus

Let's take a look at this flashlight analogy* that maps how and why designers flare and focus.

The flashlight functionality is a visual representation of an abstract process that may be difficult to comprehend at first.



A flashlight allows us to see what's ahead of us in the darkness. With the flare of the flashlight, you're able to see a wider range, but the light isn't as focused, may be weaker, and likely duller. That's why the concentrated light beam at the flashlight's center is important. We need both the flare and focus because with just one or the other, the flashlight is not as effective.

Both functions serve different purposes, but work towards a common goal: to light the way.

*analogy does not depict how divergent thinking comes before convergent thinking, but rather *why* designers use both during ideation

INCLUSIVE MULTIMODAL DESIGN

BY AMY LI

Common design research methodologies like eye-tracking and usability studies focus on what users can see. However, humans rarely experience the world with only one modality. You are most likely reading this essay using several modalities simultaneously: you might use your sense of vision to read the individual characters, and you will most likely need to use your cognitive ability to translate these symbols into ideas. In addition, you could be using your motor skill to interact with an interface that allows users to scroll down to read more. Most tech-literate users know that what's been mentioned is far from an exhaustive list of the possible interactions with this article. Many enjoy text-to-speech which engages their auditory sense. And for analog users, a physical copy of this article adds a layer of haptic sensory experience.

> Multi-modal design is the building block of inclusive design thanks to its additional affordances and its ability to augment human-computer interaction.

It is important to acknowledge the effort that web designers and developers have put into crafting digital accessibility guidelines. Many like to say that they are visual animals, which is true to an extent. "As our dominant sense, at least 50% of sensory processing is used for vision, equal to all the other senses combined (Park et al., 2018)." The emphasis on tools like contrast checkers and colorblind-safe colors is justified given the statistic that 1 in 12 white males has some form of color blindness (U.S. Department of Health and Human Services, n.d.). However, the pursuit of equitable access to digital products doesn't end with visual accessibility in regards to only white men. In fact, unimodality can be disabling for a far larger group of medically normative or "normal" users like children, pregnant wwomen, obese individuals, and elders.

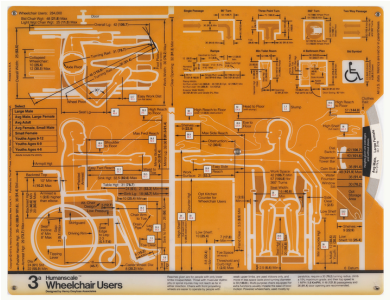


Figure 1

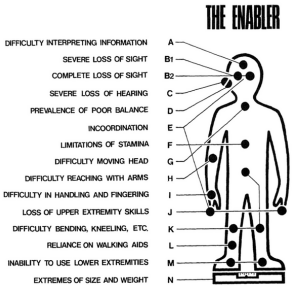


Figure 2

In the 70s, the industrial designers, or the "original multi-sensory experience designers," were the first to expand the idea of universality to mean inclusive (product) design. They abandoned the medical model of disability and challenged the legacy personas "Joe" and "Josephine" with tools like "Humanscale selector" (figure 1) and "The Enabler" (figure 2) (Lupton, et al., 2014). They adopted the social model of disability which puts the responsibility on designers to create products, services, and spaces that fit the users. The underlying belief that serving the extremes would also benefit everyone else is at the core of universal design. At the turn of the 21st century, software product designers expanded the principles of universal design and devised the term "inclusive design," which OCAD University – an art, design and media university in Canada – defines as "design that considers the full range of human diversity with respect to ability, language, culture, gender, age and other forms of human difference (Inclusive Design Research Centre, n.d.)." Inclusive design recognizes the complexity of socially constructed obstacles and seeks to leverage technology to make design adaptive to a diverse body of users. The portability of modern sensors and mechanical devices enables a myriad of device mode combinations, which also increase the risk of disabilities which Microsoft Inclusive Manual describes as "mismatched human interactions (Microsoft Design, 2016)."

> Increased mobility of technology = increased moments of disability.

As technology affords various modes of inputting and communicating data, there is more contextual information to account for in order to understand the ease of use of one mode over another. Users shift their focus and frequently translate cross-modal information. To improve our existing technologies, user researchers should expand their evaluative research methodologies to account for situational limitations and identify mismatches between users and interfaces. Activities in the Microsoft Inclusive toolkits like "Context and Capability Match" and "Situational Adaptation" challenge a product's ability to adapt to physical, social, and situational limitations. These are useful additions to any heuristic evaluation.

To help researchers consider inclusive multi-modal design as they conduct generative research, in their book Designing Across Senses: A Multimodal Approach to Product Design, Christine W. Park and John Alderman have included questions that could be incorporated into research protocols (Park, et al., 2016):

- What kind of physical information is available within an experience?
- How will people need to use it to accomplish their goals?
- What kinds of previous experiences will shape their expectations and aptitudes?
- Will they need to develop any specific skills? Develop hypotheses about these aspects of the experience and explore how individual or integrated modalities enable different user responses.

In addition to needs and behaviors, the contexts of use also affect a user's interaction with a design. The lists of questions above prompts researchers to examine the information (including other actors) in the environment, people's interaction with that information, their past experiences and expectations, and the differences in their abilities.

For specific generative and evaluative research methodologies, Microsoft Inclusive Design also has a toolkit that includes a number of activities that are useful during the discovery, ideation, iteration, and optimization stages of the end-to-end design process.

Our society has moved past the industrial age and is in the age of information. Technology greatly extends users' abilities, yet it can also become a gatekeeper to information. For example, for an elder who is visually impaired and has motor issues, smart speaker Alexa offers a means of connecting with the world and provides a sense of independence (Bogost, 2019). Humans' cognitive ability to use different modalities via substitution and translation to understand information is a great source of inspiration and motivation for multi-modal design innovation.

As researchers learn more about human factors, there will be many more opportunities for assisted interactions that are yet to be explored. Multi-model design will increase its presence as more design teams expand their inclusive design guidelines to include other senses.

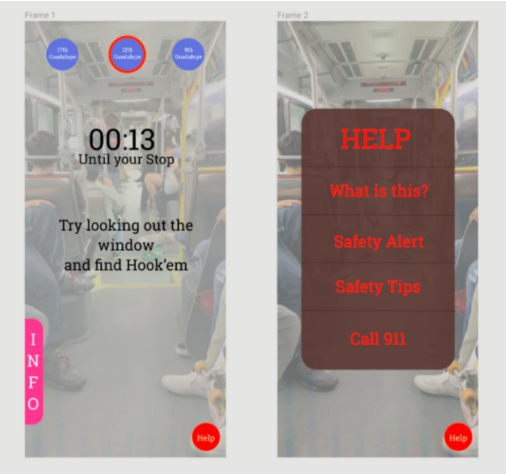
AUSTIN BUS SYSTEM PROTOTYPING

BY COREY LI

I enrolled in my first two Design Thinking courses during my sophomore year at the University of Texas at Austin. In these classes, I experienced Design Thinking in a formal setting and practiced what I learned through tangible projects.

In my first Design Thinking class, our group tackled the problem of bus security---the idea of being physically safe on a bus.

After a few weeks of going through the Design Thinking process, we began prototyping. Our ideated prototype was a bus safety app that used Augmented Reality (AR) to draw other passengers to the user's location and provided an easy way to ask for help. We tested our prototype by roleplaying situations with previous interviewees. They were receptive to our initial scenarios, but overall, our team ended up not tackling the issue. The AR app didn't provide any extra value in safety, but was more so a novel idea that we had initially thought was just "cool."



Therefore, we ended up pivoting to another idea...

With this project, I learned about digital prototyping with Figma. We chose Figma because it was a useful tool for collaboratively creating mockups of digital screens. It's also browser-based which led to less friction when making an account and beginning to prototype.

In the following semester, I worked on another UT Bus System related project. This time, our group wanted to tackle the issue of being frustrated when *waiting* for a bus. Just like last time, after going through weeks of employing the empathize, define, and ideate methods of the Design Thinking process, we began prototyping. Instead of a digital prototype on Figma, we tried to be more low fidelity and practical due to the constraints of conflicting schedules and lack of time. We ideated a **quiz game** that users could interact with when waiting on their buses to arrive. To prototype this concept, we created a short quiz on PollEverywhere (a kahoot-like app for quick quizzes) and printed out a QR code on paper. We visited various bus stops and asked people to try out our waiting game at the bus stop. Because this was a low-fidelity prototype, we provided context for our test subjects, leading people to enjoy the concept but not the prototype's experience itself.

From these experiences, I learned that prototyping, even when involving two similar subject matters, can vary based on the type of solution and time limitation, thus leading to many trade offs. On one hand, a digital prototyping tool like Figma allowed test subjects to visually experience screens but failed to replicate the rest of the user experiences. On the other hand, a low-fidelity solution with a fusion of digital and physical components was great for creating a quick and easy way to test out a concept, but lacked the means to deliver a full user experience.

Having designers enter the world of science to communicate scientific information leverages various modes of expression.

In other words, color applied to visual and layout design allows the world of engineering to come to life.

I explored this approach when designing the user experience and user interface for TREL's (Texas Rocket Engineering Lab) website, a student-led rocket engineering group at the University of Texas at Austin (Texas Rocket Engineering Lab, n.d.). The website aims to:

1. Visualize engineering machines so that they are appealing to the human eye
2. Introduce Aerospace-related artistic elements
3. Breathe life into Aerospace

While keeping in mind web accessibility guidelines in the context of the color scheme and contrast, such as where text is easier to read if the text and background colors are contrasting.

To experiment with color, we created an affinity diagram with four categories: Pop, Modern, Realistic, and Fantasy, placing images that reflect different color spectrums on the diagram to gauge the tone of the website as well as each color's feasibility within TREL's brand.

- To the engineers, TREL is a modern and realistic aerospace brand with a clean and two-tone color palette of black and white–and a gradient sky blue.
- To its audience, TREL is adventurous and innovative as well as engaging and inspiring for younger generations.
- To the sponsors, TREL is diverse, informative, and collaborative, with the mission of advancing aerospace.

All of the stakeholders above embody TREL's user base. TREL's long-term goal is to demystify the intricacies of applied rocket science. We approached this by adding elements of unexpected colors into the TREL brand to diversify the vision of what engineering looks like. We explored various color gradients to incorporate more than one color and represent the fusion of art and engineering.

Applying color theory,

- **Red** is used to portray excitement and passion on the bright spectrum, and darker hues portray leadership and courage.
- **Orange** is used to portray creativity, adventure, and youthfulness, as well as stimulation, adventure, and enthusiasm.
- **Blue** is used to portray the depth of the sky, and is associated with intuition, imagination, inspiration, and open space.
- **Beige** is used to portray naturalness, dependability, flexibility. It signifies comforting environments, and works well with coordination in regard to order/symmetry.
- **Black** is used to portray power, authority, formality, and elegance, as well as sophistication.

These colors give depth and variation to the visual elements of design and the overall website experience. We intend to prototype various combinations of colors and test them with our users to see what design aesthetic reflects TREL and to guide the launch of the website phases to view the design live.

After referencing the study eBay did on redesigning the user experience of evolving color, we became aware of the unexpected effects of:

a) making a traditional product untraditional through color
b) modifying an existing brand with a drastic change in color and visual elements

We are also exploring the method of subtly changing the design with an algorithm "that fade(s) the background color - one shade at a time over a period of several months," following eBay's example where they redesigned their interface from yellow to white progressively as it was not received well initially (Tenhue, 2017). In eBay's case, "...none of the users noticed this change" once it was implemented over time, demonstrating how a transition of brand expression can be more comfortably applied in phases.

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RETHINKING THE STUDY SPACE EXPERIENCE

BY NEIL POTNIS

Phase One

In the fall of 2019, I worked with the UT Austin chapter of **Design for America (DFA)** to better the overall student experience of study spaces on campus. The project spanned a year and a half, and through qualitative and quantitative research, immersion, interviews, and user tests, our team designed and released a **website** that addressed the shortcomings of the UT Library's current website and met student needs.

Immersion

Our first step in user research was to begin collecting quantitative data based on a list of survey questions. The survey included demographic, multiple-choice, multiple answer, rating, matrix, and open-ended questions to gauge overall impressions of student needs and reactions about studying. Students of all years, freshmen, sophomores, juniors, seniors, super seniors, and graduate students were surveyed with an even spread of data collected across all six categories.

- Year of education? - Demographic
- Do you study on or off campus? - Multiple Choice
- Have you experienced the following problems? - Multiple Answer
- What attributes do you look for in a study space? - Matrix
- How do you feel about these study spaces? - Rating
- What does your ideal study space look like? - Open-Ended
- Would you join a stranger at a study table? - Multiple Choice
- Would you mind a stranger joining you at a study table? - Multiple Choice

As a surveyor, I networked through the campus's social media pages and approached students in university spaces to fill out the questionnaire. After a week, our team received **100 survey responses** with some respondents willing to sit down with a project member for a 30-minute one-on-one interview. With these questions, we hoped to produce more qualitative data giving us further insight into the needs of the study space user.

A Few Interview Questions

- Have you faced issues finding a study space on campus?
- What study space qualities do you like?
- What are the qualities of a study space that you don't like?
- Have you ever had a problem studying in a study space?
- Where do you go for intense studying and where do you go for light studying?
- In a week, what percentage of time do you spend in hardcore studying vs light studying?
- Where do you generally study and why?
- What type of study space do you find it difficult to work in?
- What type of study space do you find it easy to work in?

Synthesis and Insights

I interviewed the survey respondents for about two weeks. After conducting **30 user interviews**, we began grouping/synthesizing the quantitative and qualitative data collected from both the surveys and interviews. Listed are the key insights from our synthesization:

Proximity to Study Spaces Matter

- Students study at spaces closest to their apartment, dormitory, or department
- Students study at spaces based on where the day "drops them off"
- Some students study at cafes based on closeness
- Finding the closest space that meets the needs of the student can be difficult

Overcrowdedness Is A Major Problem

- Too many students in a study space can be distracting
- Students find it annoying that others socialize over studying
- Student conversations can be distracting
- Prefer other students around them when studying, but not too many
- Many would join tables with other stranger students
- Group projects can be difficult to conduct

Students Don't Like Studying At Home

- Majority of students study on campus
- Students want to separate "study life" from "home life"
- Home is a space to "unwind" where as libraries are a space to "grind it out"

Noticing that overcrowdedness was a major issue, we decided to hone in on this insight which limited our opportunities -- a misstep in hindsight. Based on this insight, we identified our opportunity statement:

How might we lessen the overcrowdedness of UT study spaces?

An Abrupt Pivot

Before continuing into ideation, we felt that it was necessary to present our information to UT administrators and get their insights on the challenge identified. My team and I met with the Senior Associate Dean of Students. In the meeting, the Associate Dean stated that the building he worked in, the Student Services Building (SSB), used to be a hub for student culture hosting events and org meetings. Now, however, the SSB functions as a center for student--advisor meetings and medical appointments. Immediately, some of us got excited and thought, "What if we redesigned the SSB's open spaces as a study space having UT culture return to the building?"
This landing spot was exciting yet problematic as it did not address the opportunity that we so quickly narrowed down to -- overcrowdedness. How would the redesign of a space address overcrowdedness, especially when proximity was another identified issue and the SSB was far from the center of campus?

Phase Two

I was made Project Lead going into the second semester of UT's academic year (Spring 2020). With me being the only member remaining from the previous team, my goal was to recruit more of a multidisciplinary team to produce a variety of unique ideas and insights. After an application and interview process, our team consisted of computer science, marketing, MIS, and visualization backgrounds. With this new team, I was excited to get the project back on track -- understanding the student.

Reframing the Issue

Feeling that the redesign of the SSB was a questionable landing spot to ideate off of, I asked my team if they shared the same concern after studying the data and insights from the previous semester. Noticing that we did not have enough observational research, I purchased field books for my team. We agreed that although a great amount of information had been collected, more research was needed before entering ideation. All five of us individually traveled to various UT study spaces and observed and noted how students interacted with their study space.

Synthesizing Once More

After conducting more research, our team felt that we had a wide range of information to evaluate. I assigned each member the task of discerning insights from specific components of our immersion phase such as surveys, interviews, and observational research. We began synthesizing our clusters and narrowed down to **3 categories:**

- **Vibe** represented the student's emotional response to a study space's aesthetic
- **Resources** represented the amenities available in a study space
- **Information** represented how students come to know of a study space on campus

Within these categories, we split the noted takeaways into student **observations (OBS)** and **needs (N).**

Based on our synthesis we came to **3 new insights** that identified the challenges at hand:

- **Insight #1**: Vibe affects productivity
- **Insight #2**: Students believe that the allocation of resources is lacking
- **Insight #3**: Students choose study spaces based on what they know

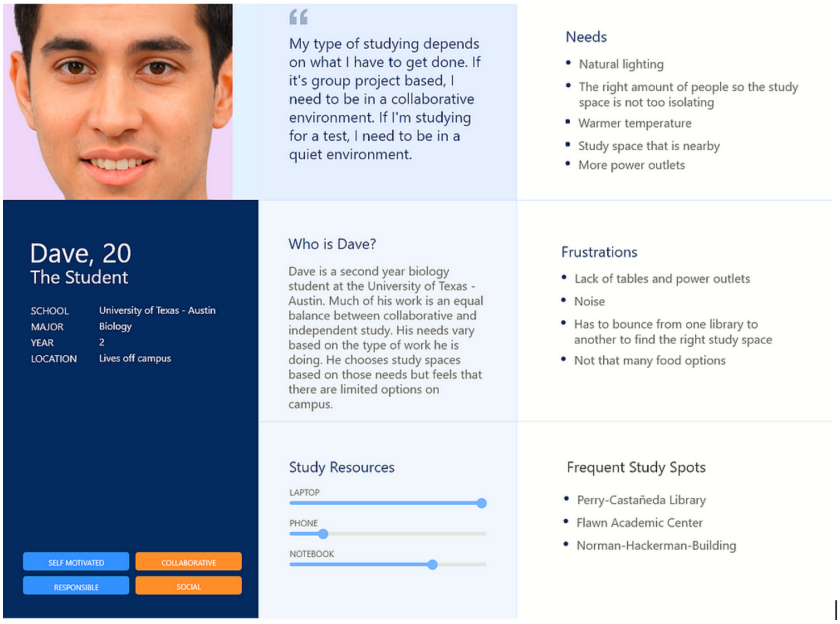
These insights included many of the previously identified insights such as **overcrowdedness** affecting the vibe of a study space and students choosing study spaces based on which libraries they know **(information)** are closest to them **(proximity)**.

Understanding Dave

Based on our insights, our team created a persona that helped us understand the needs and frustrations of the study space student. This is Dave...with Dave representing a fusion of our insights, we began writing our opportunity statements.

We used Stanford d.school's template for devising these statements as we **focused on emotions**, **amped up the good**, and **took it to the extreme** ("How Might We" Questions, 2018).

- How might we decrease Dave's frustrations when it comes to searching for a study space?
- How might we make it easy for Dave to find the right place to study?
- How might we meet all of Dave's needs in a study space?
- How might we find the best study space for Dave?
- How might we create a better study environment for Dave?

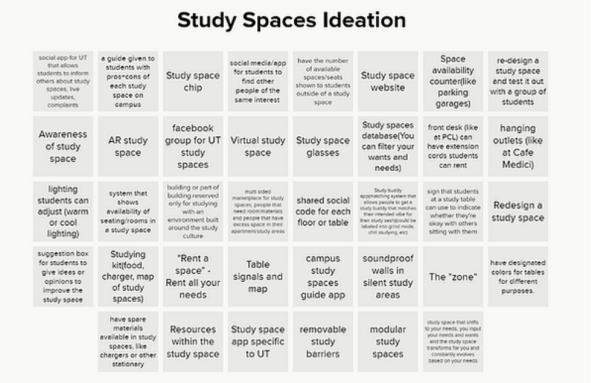


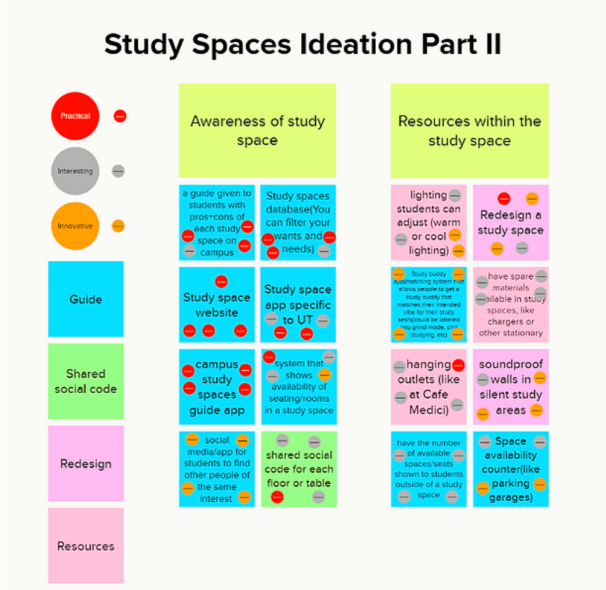
We then fused these five statements and came to an exciting opportunity:

How might we accommodate the various needs of the study space user?

Ideation

Feeling that the SSB would limit our imagination, I decided to conduct a more broad ideation session with the redesign of the SSB being one of the many ideas. Additionally, due to **COVID-19,** our project meetings switched to a virtual environment with our team taking advantage of digital workspaces such as Zoom, Mural, and Figma.



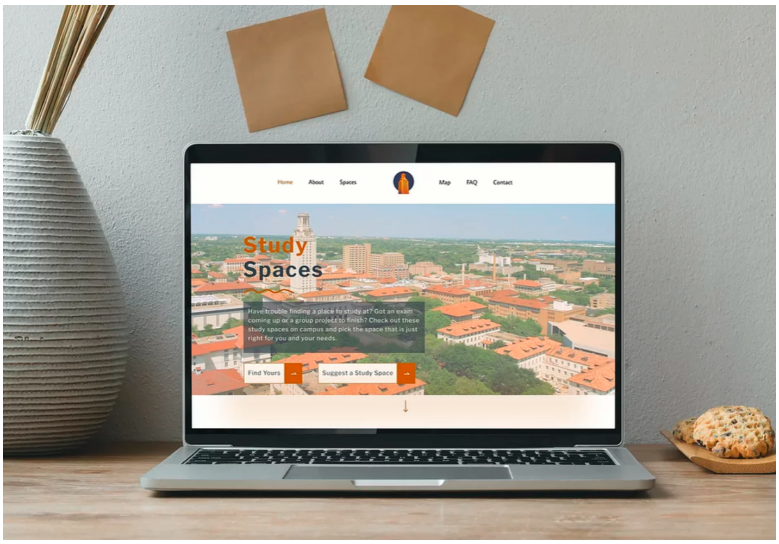


On the left, we came up with our most ambitious and practical ideas. We then began narrowing down the scope. On the right, we categorized ideas by labeling which ones were **practical**, **interesting**, and **innovative**. We then identified similar ideas and grouped them by whether they were an **informational guide, shared social code, a redesign of a space, or a resource**. We noticed that many of the ideas were some form of **guide** as indicated by the blue notes.

Prototyping

With the idea of an **informational guide** serving as the base of our prototype, we began individually sketching and visualizing the idea.

We synthesized the most exciting features from each sketch (categorization, virtual map, suggestion box) and began prototyping. Using Figma, we prototyped a website database for UT study spaces that recommended spaces based on student needs. These needs were identified from the surveys and interviews previously conducted. The student needs include the type of work (quiet or collaborative study), accessible power outlets, food nearby, proximity, and resources.



User Testing

With our high-fidelity prototype completed, we began reaching out to the students we surveyed and asked them to be involved in usability tests. Before entering these tests, however, the question we asked ourselves was whether a product like what we had prototyped existed. We found a seemingly outdated UT Libraries website. In our prototype tests, we asked users to maneuver through both UT's and our team's websites asking them to identify which features from each website they preferred and why.

We conducted **15 user tests**. The majority of students stated that they liked the search option of the original UT Libraries website by inputting the location and their preferred noise level, but overall felt that it was outdated with many of their search options leading to "no result," and feeling that the website was too cluttered.

What Worked

- The prototype was "easy to maneuver"
- Liked that their needs were listed from the get-go
- The website is to the point

Improvements

- Students study at spaces UT does not consider the "traditional study space"
- They may have multiple needs at once to filter

Based on this feedback, we added a section for **study spaces recommended by students** and **listed the various needs** a particular study space would be good for.

Phase Three

We met with the Director of the UT Libraries in the summer of 2020. In this meeting we presented our data, insights, prototype, and user feedback. Although the director was kind to listen to our team, he had more of a bureaucratic approach towards the process. Something as simple as a website redesign took multiple steps and we were surprised to learn that the UT Libraries website was in fact, “up to date.” The director stated that he would send our insights to their UX/UI Lead but a redesign of the website was improbable. With this, we resorted to Plan B: implementing the idea ourselves.

Since I was promoted to Studio Lead (Executive Director) of the DFA - UT Austin chapter leading into summer 2020, I decided to take on a consultancy role to the project and promote one of the project members to Project Lead. In the Fall 2020 semester, she recruited a new team with two of the previous project members returning and began implementation. In January 2021, the project was implemented as a Notion website which is now used by the student body at the University of Texas at Austin.

Overall, the DFA Study Spaces project taught me the value of patience and what it does for a process. I am proud to have been able to work with such a diverse and amazing team for such a long period of time.

Website: https://utstudyspace.me/

Case study: https://www.neilpotnis.net/design-for-america

PRODUCT
Analysis

UNDERSTANDING XR

BY CELINE LOW

Reality technologies are becoming increasingly common in various aspects of modern life. For example, in the gaming world, Pokemon Go is a forerunner of integrated augmented reality while Oculus has become the most well-known brand for virtual reality devices.

Augmented reality (AR)

Augmented reality (AR) merges the real world with the digital world by using a device's camera to add interactive digital elements to the user's physical environment. Its ultimate goal is not to replace the real world with a digital one, but rather to enhance it with computer-generated creations.

AR recognition is relatively simple. First, the physical environment is scanned through the user's camera, and specific points in space are recognized and stored by the device. Once virtual points are established, the device's programmed AR solution will display computer-generated content onto the environment.

A popular method for recognizing data is the use of markers, or real-life visual cues that trigger AR solutions. In most cases involving markers, a user would point their camera to scan the physical marker in the real world, and an AR solution would be displayed on-screen within the programmed confines of the marker.

AR has a variety of uses (B., 2021). One well-known example of AR is in the mobile application, "Pokemon Go." Players can catch on-screen Pokemon displayed on top of their physical environment, simulating the feeling of being a Pokemon trainer. Other popular examples of AR include facial filters popularized by social media apps like Snapchat and Instagram.

While AR has multiple uses for entertainment, it also has practical applications that are becoming increasingly popular in various industries. In medicine, tools like Proximie allow medical professionals to handle procedures from a distance using AR technology. AR can also give doctors a more visual, interactive way to explain complex concepts to their patients. In education, AR is being used to display mathematical and scientific models in 3D, as well as to enhance children's learning through AR visualizations of storybooks or flashcards.

The possibilities of AR are endless. Because of its essential interaction with the real world, AR is often seen as a technology that must go mainstream before virtual reality does. From a designer's perspective, there is a variety of tools that can be used to create and customize AR, from Facebook's Spark AR Studio to Adobe Aero, to a multitude of third-party platforms which—when compared with virtual reality and mixed reality—are fairly easy to code from scratch using HTML or Javascript.

Of course, AR is not perfect; design constraints often include the need for flat surfaces, and a lack of such can make on-screen solutions appear distorted. A better understanding of 3D space by designers will allow AR to flourish at a greater capacity.

Virtual reality (VR)

Unlike augmented reality, virtual reality (VR) goes beyond enhancements and fully replaces the user's environment with a computer-generated world. By strapping on headset products like the Oculus Rift or Google Daydream, users can become immersed in digital experiences that give the impression of being inside an artificial world.

VR headsets blackout external vision and focus users on the screen in front of them. By utilizing sound and graphics, and reacting to the user's eye and body movement, the end result of VR is a very real first-person experience. For example, the experience and emotional appeal (and even the stomach-dropping sensation) of riding a rollercoaster could be effectively replicated with VR technology right from one's own home.

In general, VR aims to provide users with experiences that are not easily accessible or are impossible to get in the real world. VR's ability to fully immerse users in an artificial reality is its greatest strength over other immersive technologies.

Currently, the gaming industry has been VR's most impacted industry. One of VR's greatest barriers to mainstream usage is high costs; for example, someone interested in playing a VR video game would need to purchase a smartphone or video game console, a VR headset to connect to (which alone may cost up to $800), the VR video game itself, and quite possibly additional VR accessories, such as touch/motion controllers (Robertson, n.d.). Along with AR technologies, VR can often take great technical expertise to create. However, the VR industry as a whole is continuing to address these pain points while integrating this technology into more industries.

Mixed reality (MR)

Mixed reality (MR) overlays the real world with virtual content and allows users to interact with both the real world and virtual world simultaneously. It is in its own category of reality technology, although it has characteristics of both AR and VR.

Similar to AR, MR places computer-generated objects onto the real world. It uses the real world to build out a digital experience, and will often utilize extra sensors — like those found in VR accessories — to track and align the physical world to the virtual one (B., 2021).

The Microsoft Hololens is a great example of a mixed reality device. It focuses on four aspects of user experience: how the user sees the world, how to keep digital content in place, how to make digital content feel real, and how to keep the user comfortable (Microsoft, 2020). These areas present one of the most interesting challenges of mixed reality and its design potential: it must create both a physical experience as well as a virtual one.

The Future of Reality Technologies

Ultimately, reality technologies are set to become the "new normal." For designers, this means entering a new world of creation and interaction, from motion design to a shift from 2-D to 3-D to sensor design.

MICROTRANSACTIONS IN GAMING

BY BRUCE LUO

In the 21st century, gaming has become what television and radio were back during their respective peaks - an electronic entertainment medium that captured the youth's attention, ultimately emerging as a dominant subculture. Over the years, gaming has evolved from a niche market into an industry projected to reach $138 billion in revenue by 2021, according to a market study conducted by Statista (Statista, 2021). This growth can be attributed in large part to the introduction of **microtransactions**, described by Gamespot's Eddie Makuch as such:

There is no one catch-all definition for microtransactions that perfectly encapsulates and represents the term. But generally speaking, a microtransaction is anything you pay extra for in a video game outside of the initial purchase (Makuch, 2018).

Last year, in the United States video game industry, microtransactions made up $26.73 billion out of $43.4 billion total, accounting for more spending than that of hardware, software, and gaming peripherals combined (Kain, 2019). How did this revenue shift come about, where do microtransactions stand now, and where will they go in the future?

Humble Origins

Microtransactions did not always exist. To understand how they came about, we need to define DLC and mods. DLC is short for downloadable content, and refers to any piece of content that can be installed onto a game after release. Mods in the context of gaming refer to typically fan-made modifications and/or additions to a game's code that changes some aspect of gameplay, and can be thought of as free DLC. In the 90s, player-created mods were exploding in popularity, and some developers even supported the modding scene by including official modding tools.

As a testament to the enduring legacy of the scene, popular franchises like Counter-Strike and Team Fortress originated as mods from landmark titles such as id Software's Quake and Valve's Half-Life. Soon, however, companies saw an opportunity to monetize games even further. The first large-scale backlash came when publisher Bethesda Softworks released a primarily cosmetic horse armor DLC for $2.50 in their game The Elder Scrolls IV: Oblivion (Crecente, 2017). Despite garnering negative reception, the DLC went on to become a top seller; since then, the microtransaction has only gained further traction among publishers, paving the way for its ubiquity in the current gaming climate.

Pitfalls in Design

When analyzing microtransaction design, there are a few key aspects to consider:

- **Balance** between gameplay reward system and microtransaction value
- **Relationship** between paying and non-paying players (in multiplayer games)

Crystin Cox adopts a psychological lens to characterize value-adding mechanisms for players in her GDC 2018 talk:

There are many models available for understanding why people do things. I prefer to use Self Determination Theory because its examination of intrinsic motivation is well suited to game design work, particularly reward and monetization work. Quickly, SDT tells us that many higher level human behaviors are driven by intrinsic motivators, not extrinsic rewards or punishments. Further, intrinsic motivations exist to satisfy three high band human needs: Autonomy, Mastery, and Relatedness. Many microtransactions do fall cleanly into satisfying one of these needs... (Cox, 2018).

So, what constitutes a good microtransaction design? Let us examine microtransactions in some recent games.

First off is Ubisoft's *Assassin's Creed Odyssey* (AC:O), a 2018 single-player action RPG. In AC:O, the store contains cosmetic changes, premium weapons, resource packs used for upgrades, and XP/money boosters, the last of which are by far the most controversial offerings in the store. This can be explained by the addition of "Olympian Gifts" loot boxes that can be grinded for and that have a chance of dropping premium store items sans XP/money boosters. Given time, all items but the boosters may be acquired through normal gameplay. However, many feel XP boosters are necessary for an enjoyable playthrough. Ben Kuchera from Polygon states the problem succinctly:

This could be poor balancing or it could be a matter of Ubisoft pushing players toward paying to solve a problem the publisher created with the slow and controlled leveling system, but either way it's a bad deal for players (Kuchera, 2018).

If the benefit of the doubt is given, then one may believe that the game is simply balanced poorly. In single-player RPGs, however, mastery/power progression is almost always a core part of the gameplay reward system, so there is little excuse for poor balancing to occur. The inclusion of XP boosters that provide mastery value imply that progression is balanced around that item, and therein lies the conflict: those who refuse to dole out the money for an XP booster end up with a dissatisfactory and inconvenient leveling experience.

In 2017, EA's Star Wars Battlefront II (BF2), a multiplayer shooter, stirred up extreme controversy over its microtransactions. The original in-game store contained loot boxes, which awarded prizes ranging from emotes to abilities powering up characters to virtual currency needed to unlock new characters. The uproar came from the fact that players could pay to immediately acquire large gameplay advantages, whereas a non-paying player would have to spend thousands of hours to unlock every character and upgrade (Park, 2017). So great was the backlash garnered that EA decided to remove the store upon release, only to rebalance it at a later date.

With *Battlefront II,* a similar problem to that of AC:O arises. BF2's progression system rewards mastery and autonomy through power-ups and content unlocks (characters). However, it is also heavily time-gated to push players towards gambling through loot boxes, which provide the same values as playing without microtransactions. Also of note is how Battlefront II ignores the second key factor of microtransaction design, the relationship between paying and non-paying players. Players are privy to perceived fairness – for example, if a new player could join and spend money to instantly be on par with an experienced player, that would constitute unfair microtransaction practices – such is the case here.

For an example of microtransactions implemented in a more consumer-friendly manner, look towards Riot Games' League of Legends. In this game, gameplay rewards are solely based around autonomy value, giving players the ability to unlock more champions to play as in-game. Microtransactions, on the other hand, are catered towards relatedness in the form of champion skins, player icons, and other cosmetic items unobtainable through normal play. By dividing gameplay reward and microtransaction value between autonomy and relatedness, the relationship between paying and non-paying players is kept balanced, creating a fair system.

So, regarding good microtransaction design,

it is generally safer to design games such that reward systems and microtransactions each target value propositions in different categories. This ensures that gameplay progression itself does not have to be balanced around spending money. This principle is especially important for multiplayer games, in which having a good relationship between paying and non-paying players is key to maintaining a populated player base. If paying players have an advantage, then non-paying players are incentivized to either pay or quit – and quitting is bad for player count.

Challenges and Opportunities

Public opinion is split on whether microtransactions are a positive addition to gaming. In a 2018 study conducted by Qutee, gamers were surveyed, among other things, for their opinion on microtransactions (Qutee, 2018). The results indicate that while most gamers do not openly advocate for microtransactions, they would also rather not pay an increased up-front cost for content. The implication, then, is that gamers prefer the historical monetization approach of direct game sales only. As gaming evolves, however, this approach will only continue to be phased out, especially with the advent of free-to-play games and GaaS (games as a service). As microtransactions are the most lucrative implementation of GaaS, it seems inevitable that they will continue to exist and shape the gaming industry in the foreseeable future. Thus, the real challenge is twofold:

1)
How can microtransaction design fulfill the developers' and publishers' need for revenue to improve their games?

2)
How can microtransaction design also satisfy the players' need for a game that maximizes their enjoyment?

Unfortunately, there is no easy answer to these questions. As designers continue to innovate with regards to gaming and monetization, perhaps something entirely new may come about - only time will tell.

AGILE DEVELOPMENT

BY RANJAN VELUDANDI

I was working at my first internship in the technology sector of a Fortune 200 company. Being a part of a product development team, I heard so much terminology that seemed unfamiliar: buzzwords like Agile, Kanban, Scrum were unknown to me but carried lots of value. By using context clues, I deduced that the primary meaning of these words had to do with efficiency.

The world, especially the technology industry, is very competitive. Everyone's out to release the best product as fast as possible. How are companies able to develop and produce so quickly? These terms may go over the heads of an early professional at first, but they are critical to the process of project and product development. These buzzwords fall under the **agile** umbrella, a way of working that's been acknowledged as an optimal organizational process for development. Once acclimated to the agile methodology, I understood its importance to the development process at my internship.

What is Agile?

Agile is a set of principles and a collection of beliefs intended to help teams make the most effective decisions. It is an **iterative** approach to project management - instead of tackling big, long term tasks, **an agile team works in smaller increments to produce the end product**. The purpose of the agile process is to give a foundation for making the best decisions during development. Projects are evaluated frequently so teams can respond to change agilely. This methodology encourages collaboration within the team and with customers to create a shared vision and bring it to life. The agile method is not set in stone; it is meant to be **flexible** and can adjust to a product/software development team's needs. To learn what it means to be agile, a good starting point is the short but critical *Agile Manifesto*.

The Agile Manifesto

The Agile Manifesto consists of four values and twelve principles:

Values

1) **Value individuals and interactions** over processes and tools

- The most effective method for sharing and retaining information is through face-to-face conversation. It builds trust and motivates the development team. An open, collaborative environment leads to the best results.

2) **Value working product/software** over comprehensive documentation

- Documentation can be useful, but not when there is no working product. Create the product first, then write in-depth documentation.

3) **Value customer collaboration** over contract negotiation

- The end goal is to satisfy the customer's needs. Continuously update the customers with progress, and request feedback. The contract will come after!

4) **Value responding to change** over following a plan

- A plan is good to have, but the ability to adjust is even more important. Obstacles or ideas can pop up on the fly.

Principles

1) Customer satisfaction is the highest priority through early and continuous delivery.

2) Accommodate changing requirements throughout the development process.

3) Frequently deliver working products

4) Maintain collaboration between business stakeholders and developers throughout the project

5) Support, trust, and motivate the people involved

6) Enable face to face interactions for an effective method of communication

7) A working product is the primary measure of progress

8) The agile process promotes sustainable development. A constant pace should be maintained

9) Attention to technical detail and design enhances agility

10) Simplicity

11) Self-Organizing teams encourage great architectures, requirements, and designs

12) Regular reflections on how to become more effective

The motto of the manifesto is simple. "We are uncovering better ways of developing software by doing it and helping others do it."

Frameworks

When it comes to working agiley, there are two popular frameworks: Kanban and Scrum. Sometimes a hybrid of the two are used to fit the needs of a development team. These frameworks establish a plan to ensure the work progresses smoothly.

Kanban

The Kanban framework relies on the Japanese Kanban board, first implemented by Toyota in the 1940s. This board's purpose is to standardize the workflow, allowing for work items to be visually tracked. The development team and any partners can easily see action items, current work, and what has already been completed. It requires full transparency and real-time communication to be effective. If used correctly, it allows for better flexibility and fewer bottlenecks.

Scrum

The Scrum framework serves the same purpose as Kanban, but in a different style. It starts off with a **backlog**, a dynamic list of work that might be needed for the product. Next are the **sprints**, wherein people set goals for the upcoming period (usually 1-4 weeks) to tackle a set of backlog tasks.

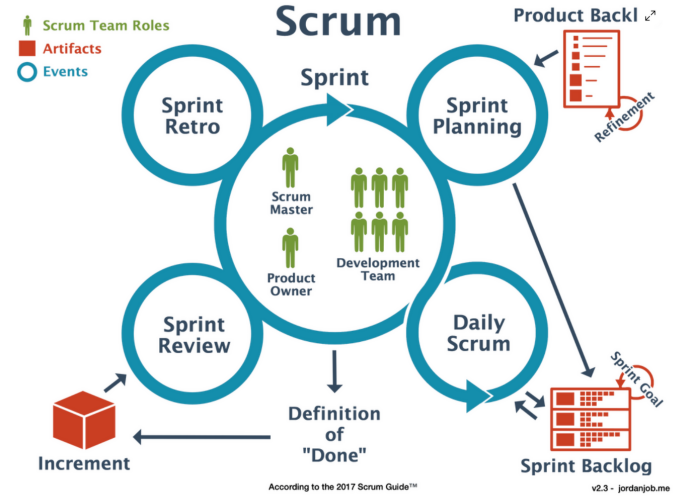


Image @Jordan Job

Teams have short meetings (daily scrums) to update each other on their progress in the sprint. At the end of each sprint, they show business partners and customers what has been done, and have a sprint retrospective to analyze what could have been improved. They also plan out the next sprint. Scrum gives teams an empirical, hands-on, substantial foundation, allowing them to deliver more frequently than if they had been using a non-agile method.

The agile method can take the place of standard approaches for development, especially for teams looking for a flexible approach. Even though primarily used in the software industry, it is not exclusive. The agile methodology can be implemented in any business, and is a non-linear plan to help crush requirements.

ROBINHOOD: AN UNWORTHY KING

BY ROGER ZHONG

For a long time, people have associated the words “trader” and “investor” with men in suits staring at multiple monitors’ worth of numbers, working feverishly to calculate the next big move. In a similar vein, much of the population has shied away from the stock market as a means to build wealth, often because they view it as too risky, difficult, or boring. The popularization of smartphones during the 2010’s has turned this paradigm, along with many others, on its head. With an internet traffic growth of 222% from 2013 to 2019, designers and developers are now able to reach wider audiences with ease (Broadband Search, n.d.). In the wake of Angry Birds and Snapchat came Robinhood, an unassuming mobile trading platform with only one goal in mind -- to make trading so easy as to be instinctual. The idea was that if you know how to operate a smartphone, you know how to trade.

Interface

This idea is reflected in Robinhood’s wholly minimalistic interface. Starting from the home screen, the user’s account value is displayed at the top, which is a useful and oftentimes addicting number to track throughout the day. The account summary is followed by a default stock watchlist, from where one can immediately tap on an entry to go to another screen. Here, we see the company name, the share price, and a minimalistic chart that shows the general movement of the price over a selection of timeframes. Statistical information about individual stocks/ETFs does not go very far beyond what is required to get approval from the SEC. Surprisingly, the news section provides a satisfactory consolidation of recent stories and analyst reports which are useful for quick research. At the bottom lies a large button labeled “Trade.” When users tap on it, they are taken to the trade confirmation screen, where they enter their desired number of shares and entry method before swiping up to submit.

In total, users take three steps starting from the home screen to make a trade. Therein lies the difference in user experience between Robinhood and other trading platforms: because of its app layout, users can place a trade minutes after waking up or during the short lunch break they have at work. Even among lower income Americans, smartphone apps have become almost a necessity of modern life, so Robinhood theoretically allows users to buy stocks when they otherwise wouldn’t be able to do so due to broadband limitations or lack of a PC (Anderson & Kumar, 2019).

Going Commission-free

Besides its user interface, the most attractive feature Robinhood has to offer is its commission-free trading. For most of stock market history, traders had to pay a flat commission fee, either to a stockbroker directly or to a traditional online brokerage to place an order. Not only is this a hassle for novice traders, but many people do not have the capital to mitigate the larger upfront cost. The smaller the trade amount, the greater the percentage of the total cost this commission takes up, and the less sense it makes to enter a trade.

With the introduction of commission-free trading, Robinhood changed the business model of online brokerages. It turns out that brokerages don't rely solely on commissions to make money, but have other means as well - such as interest on margin loans. By sacrificing revenue per trade for pure trade volume, Robinhood invited new and experienced traders alike to migrate to a platform where they can buy and sell to their heart's content. Being a first mover in this space gave Robinhood an advantage compared to other online brokers. Even in 2019, when major brokerages like TD Ameritrade and Charles Schwab followed suit to a commission-free model, Robinhood continued to hold on to its 10 million strong user base.

A caveat about Robinhood orders is that their execution prices are almost always higher than those of competing platforms. This means that the user will pay a little more per order than if they made the same order at the same time on a competing platform. Sometimes, Robinhood receives payments from market maker firms in exchange for routing orders to them even if it means little price improvement for the customer. This concept is called "payment for order flow" and was a subject for controversy when Robinhood was sued in December of 2020 (U.S. Securities and Exchange Commission, 2020). This calls into question the true cost of commission-free trading as envisioned by Robinhood.

Technical Problems

Many users have lodged complaints about the app over its lifetime, but even early on, many saw through Robinhood's novel user interface and pointed out some major operational limitations of the app. The first obvious issue stemmed directly from the UI design: interface is too simple at times and therefore does not provide enough information for many users to make informed trades. Consequently, users often resort to PC applications or other mobile apps in order to gather the information they need, which partially defeats the purpose of having a streamlined UI flow.

Performance has been described as inconsistent at best. Stock prices and charts periodically fail to update in real time. Trading services that are supposed to be running promptly at 9:30 EST are often bogged down by overloaded servers during the first few minutes after the opening bell, putting users at a disadvantage for time-sensitive trading. To make matters worse, there have been several noteworthy systemwide outages during times of peak volatility at the beginning of the COVID-19 pandemic (Peters, 2020). Both short term traders and long term investors were impacted, sometimes losing thousands of dollars from their accounts because they were unable to close out of their stock positions.

Popularization of Options Trading

Robinhood's options trading platform is popular among eager young traders due to its almost nonexistent requirements for proof of experience. While this gives options traders a sense of newfound freedom, such freedom is often undermined by Robinhood's subpar services. The general performance issues mentioned before apply here and then some: Robinhood's option pricing data updates at irregular intervals, and the order process is slow to execute. However, these issues pale in comparison to Robinhood's more egregious violations of their commitment to customers. In the summer of 2020, twenty year old Alex Kearns committed suicide not long after entering an options trade (Dokoupil, 2021). In short, he saw a large negative balance in excess of $700k on his account and immediately believed it before doing research on the theoretical maximum loss of his trade. In reality, this negative balance was an intermediate value that did not reflect the would-be final state of his account. While there was no technical error on Robinhood's part, there is an ethical imperative to immediately reassure users through the app interface, especially when much of Robinhood's target audience is inexperienced. For example, during weekends, some brokerages explicitly disclose that options transactions are pending and may hide the outcome of options trades until everything is settled. Others provide phone support.

Customer Support

On the topic of support, Robinhood is unique in that it is the only major broker that does not offer live phone support. They have a phone number, but calling it simply returns an automated response redirecting users to their online support center, which has a dedicated user flow for submitting support tickets. The response time is usually within a day, which is acceptable, but having a human to talk to would resolve urgent issues much faster and at the very least give customers a sense of security. Regardless, this is the model that Robinhood has created, likely because of their reliance on technology to pursue lower costs. Their reinvention of customer service reflects their product design philosophy of simplicity and automation.

Recent Events

At the beginning of 2021, an online Reddit forum by the name of WallStreetBets started a widespread initiative targeting large hedge funds by mass-purchasing a few stocks that were heavily shorted. Their goal was to force the funds to close out of their positions at a large loss by squeezing them out of their short positions. The funds borrowed shares to sell them at present market value, hoping that the price would go down in the future so they could make a profit. However, if the price increases, the funds will have to close their positions by buying back the borrowed shares in order to avoid the risk of losing all their assets, thus further increasing the price. As a result, one affected company, Gamestop (GME), has seen its stock rise to over ten times its previous baseline value. Many WallStreetBets users posted thousands of dollars in gains. The whole event made national headlines for a week, but this incredible movement was dampened by Robinhood taking matters into their own hands. On January 28th, 2021, Robinhood restricted users from buying GME (Fitzgerald, 2021). Because the users who frequent WallStreetBets are young, many of them use Robinhood to trade stocks and options, so this restriction impacted over half of its community. This allowed the hedge funds to recover and limit their losses, and the price of GME subsequently decreased in the coming days.

Robinhood argued that they did this to preserve stability in the financial markets, but many people, including notable congressional members and CEOs, called out the hypocrisy of protecting Wall Street firms over retail traders. If the firms can coordinate with one another and move massive amounts of capital through the stock market, it would set a double standard to prevent retail traders from doing the same. The Gamestop debacle drew additional scrutiny upon Robinhood's product positioning. If the goal of their app was to make the stock market accessible to everyone, then they should not use their popularity as a means to gain control over their customers. This goes against the idea of a free platform that Robinhood was often praised for having.

Verdict

To be devil's advocate, Robinhood was most likely not maliciously conspiring against its own user base. Due to lack of planning, Robinhood (and a few other brokers) were caught off guard by the GME movement and did not have the funds to cover the settlement for those trades.

This brings our attention to the real problem that many people have with Robinhood. It has repeatedly failed to recognize the significance of customer relationship management (CRM) (Salesforce, n.d.). During the outages, during the suicide of Kearns, and during the GME short squeeze, little care was taken to forge a constructive relationship with users. People felt that their voices were not heard and that Robinhood did not give a sufficient response during times of confusion. The app feels very impersonal, and so does its customer service. Even if a company has a great product, it still needs to provide adequate customer support to address the needs of a large user base. As it stands today, Robinhood's platform is inviting but at the same time unforgiving to aspiring traders who may have needed additional support.

Either because of personal experiences or recent controversies, some users are turning to other trading platforms. Most online brokers now offer commission-free trades, and platforms like Webull and M1 Finance are bringing their own innovative ideas to the world of FinTech. These alternatives offer more complete market data, better customer support, and features that enable users to build their own community within the apps themselves. That is not to say that they are without their own limitations, though, and none of them are going to dislodge Robinhood from its top spot any time soon.

Robinhood is here to stay purely by virtue of being the first company to break ground in an otherwise incremental industry. To every new trader out there, don't be afraid to try the app. Just do your research, limit your risk, and prepare for the unexpected.

REFERENCES

Food Insecurity Among College Students

- USDA. (n.d.). *USDA ERS - Food Security in the U.S.* Retrieved January 12, 2021, from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/
- The University of Texas at Austin. (n.d.). *UT Outpost*. Office of the Dean of Students. Retrieved January 12, 2021, from https://deanofstudents.utexas.edu/emergency/utoutpost.php
- The Hope Center. (n.d.). *The Hope Center for College, Community, and Justice is driving the #RealCollege movement to assist students' basic needs for food and housing. Donate to support #RealCollege students.* Hope4college. Retrieved January 14, 2021, from https://hope4college.com/
- ap. (2018, March). *Food Insecurity among College Students: An Exploratory Study*. annexpublishers. http://www.annexpublishers.co/articles/JNH/5106-Food-Insecurity-among-College-Students-An-Exploratory-Study.pdf
- Use and Perceptions of a Campus Food Pantry Among Food Insecure College Students: An Exploratory Study from Appalachia. (2020). *Journal of Appalachian Health*, *2*(2).
- PMC. (2019, October). *College students' interpretations of food security questions: results from cognitive interviews*. NCBI. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6788030/IES. (2019). *Tuition costs of colleges and universities*. National Center for Education Statistics. https://nces.ed.gov/fastfacts/display.asp?id=76

User Personas and Design Thinking

- Lee, G. B. (n.d.). [Free Template] User Persona (Professional Model) [Template]. Dribble. https://dribbble.com/shots/4171825--Free-Template-User-Persona-Professional-Model
- Personas – A Simple Introduction. (n.d.). The Interaction Design Foundation. Retrieved July 8, 2020, from https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them

Implications of NFTs on the Art Community

- Cascone, S. (2021, April 2). Here Are the 10 Most Expensive NFT Artworks, From Beeple's $69 Million Opus to an 18-Year-Old's $500,000 Vampire Queen. Artnet News. https://news.artnet.com/market/most-expensive-nfts-1952597
- Sussman, A. L. (2018, December 12). Why You Can't Always Buy a Work of Art Just Because You Have the Cash. Artsy. https://www.artsy.net/article/artsy-editorial-buy-work-art-cash

Humanitarian AI and Vulnerable Populations

- Shivayogi, P. (2013, March). Vulnerable population and methods for their safeguard. PubMed Central (PMC). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3601707/
- Artificial Intelligence Principles for Vulnerable Populations in Humanitarian Contexts. (2020). DH Network.
- Madianou, M. (2019). The Biometric Assemblage: Surveillance, Experimentation, Profit, and the Measuring of Refugee Bodies. Television & New Media, 20(6), 581–599. https://doi.org/10.1177/1527476419857682
- Romeo, N. (2017, June 19). The Chatbot Will See You Now. The New Yorker. https://www.newyorker.com/tech/annals-of-technology/the-chatbot-will-see-you-now

Making Sense of Chaos

- The Interaction Design Foundation. (2020, August 1). Design Thinking: Get a Quick Overview of the History. https://www.interaction-design.org/literature/article/design-thinking-get-a-quick-overview-of-the-history
- Intelligent Systems. (2006, July). Making Sense of Sensemaking 1: Alternative Perspectives (No. 4). http://perigeantechnologies.com/publications/MakingSenseofSensemaking1-AlternativePerspectives.pdf
- Wax, D. (2018, January 3). Writing and Remembering: Why We Remember What We Write. Lifehack. https://www.lifehack.org/articles/featured/writing-and-remembering-why-we-remember-what-we-write.html

Student Experiences with Design - A Conversation with Martha Czernuszenko

- Planet Texas 2050. (n.d.). Bridging Barriers. Retrieved October 12, 2020, from https://bridgingbarriers.utexas.edu/planet-texas-2050/

Instructional Design

- Luka, I. (2014). Design Thinking in Pedagogy. Journal of Education Culture and Society, 2. https://www.researchgate.net/publication/280576280_Design_Thinking_in_Pedagogy
- Speicher, S. (2019, June 25). Where Should Innovation In Education Come From? Medium. https://brightthemag.com/letter-one-db955da85761
- CoAction. (2013). Forward-oriented design for learning: illustrating the approach. https://journal.alt.ac.uk/index.php/rlt/article/view/1402/pdf_1
- Schein, M. (2019, January 10). The Next Revolution In Education: Design Thinking. Forbes. https://www.forbes.com/sites/michaelschein/2019/01/08/the-next-revolution-in-education-design-thinking/?sh=2cd5572761c6
- Morelli, N. (2002). Designing Product/Service Systems: A Methodological Exploration. Carnegie Mellon University. http://www.cs.cmu.edu/~jhm/Readings/Morelli.pdf

Imagining the World of Engineering in Color

- Texas Rocket Engineering Lab. (n.d.). Texas Rocket Engineering Lab. Retrieved March 28, 2021, from https://texasrocketlab.com/
- Tenhue, N. (2017, February 28). The Unexpected Effects of Redesigning the User Experience. UX Blog. https://theuxblog.com/blog/redesigning-user-experience

Light The Way: Divergent & Convergent Thinking

- Custom Writing Services. (2017, March 12). Convergent Thinking - IResearchNet. Psychology. http://psychology.iresearchnet.com/developmental-psychology/cognitive-development/convergent-thinking/
- Boogaard, K. (2018, September 4). Convergent Thinking vs. Divergent Thinking. Wrike. https://www.wrike.com/blog/convergent-thinking-vs-divergent-thinking/

Rethinking the Study Space Experience

- “How Might We” Questions. (2018, March 16). Stanford d.School. https://dschool.stanford.edu/resources/how-might-we-questions

Inclusive Multimodal Design

- Designing across Senses: a Multimodal Approach to Product Design, by Christine W. Park and John Alderman, O'Reilly Media, 2018, p. 59.
- “Color Blindness.” National Eye Institute, U.S. Department of Health and Human Services, www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/color-blindness.
- Lupton, Ellen, et al. Beautiful Users Designing for People. Princeton Architectural Press - Cooper Hewitt, Smithsonian Design Museum, 2014.
- “What Is Inclusive Design.” Inclusive Design Research Centre, legacy.idrc.ocadu.ca/about-the-idrc/49-resources/online-resources/articles-and-papers/443-whatisinclusivedesign.
- Microsoft Design Inclusive Toolkit Manual, Microsoft Design, 2016
- Designing across Senses: a Multimodal Approach to Product Design, by Christine W. Park and John Alderman, O'Reilly Media, 2018, p. 138.
- Bogost, Ian. “Alexa Is a Revelation for the Blind.” The Atlantic, Atlantic Media Company, 30 Aug. 2019, www.theatlantic.com/magazine/archive/2018/05/what-alexa-taught-my-father/556874/.

Understanding AR, VR, and MR

- B., G. (2021, February 17). VR vs AR vs MR: Differences and Real-Life Applications. RubyGarage. https://rubygarage.org/blog/difference-between-ar-vr-mr
- Robertson, A. (n.d.). The ultimate VR headset buyer's guide. The Verge. Retrieved December 16, 2020, from https://www.theverge.com/a/best-vr-headset-oculus-rift-samsung-gear-htc-vive-virtual-reality
- Microsoft. (2020, December 9). Start designing and prototyping - Mixed Reality. https://docs.microsoft.com/en-us/windows/mixed-reality/design/design

Microtransactions In Gaming

- Statista. (2021, January 29). Value of the global video games market 2012–2021. https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/
- Makuch, E. (2018, November 21). Microtransactions Explained: Here's What You Need To Know. GameSpot. https://www.gamespot.com/articles/microtransactions-explained-heres-what-you-need-to/1100-6456995/
- Kain, E. (2019, January 24). This Is Why Video Game Microtransactions Aren't Going Anywhere. Forbes. https://www.forbes.com/sites/erikkain/2019/01/23/video-game-accessories-in-game-purchases-and-subscriptions-drove-industry-growth-in-2018/#74b7eb0d3d24
- Crecente, B. (2017, November 28). What Are DLC, Loot Boxes and Microtransactions? An Explainer. Variety. https://variety.com/2017/gaming/features/what-is-a-loot-box-1203047991/
- Cox, C. (2018). Good Design Makes Happy Customers. GDCVault. https://www.gdcvault.com/play/1025345/Good-Design-Makes-Happy-Customers
- Kuchera, B. (2018, October 3). Assassin's Creed Odyssey has a huge grinding, microtransaction problem. Polygon. https://www.polygon.com/2018/10/3/17931920/assassins-creed-odyssey-level-grinding-microtransaction-problem
- Park, G. (2017, November 18). How a Star Wars video game faced charges that it was promoting gambling. The Washington Post. https://www.washingtonpost.com/news/comic-riffs/wp/2017/11/18/how-a-star-wars-video-game-faced-charges-that-it-was-promoting-gambling/
- Qutee. (2018). Gaming Today. https://www.qutee.com/q/gaming-today-report/

Agile Development

- Muslihat, D. (2021, January 14). Agile Methodology: An Overview. Zenkit. https://zenkit.com/en/blog/agile-methodology-an-overview/#:%7E:text=Agile%20methodology%20is%20a%20type,functional%20teams%20and%20their%20customers
- Agile Manifesto. (n.d.). Principles behind the Agile Manifesto. Retrieved July 16, 2020, from https://agilemanifesto.org/principles.html
- Agile Alliance. (2021, February 19). 12 Principles Behind the Agile Manifesto. https://www.agilealliance.org/agile101/12-principles-behind-the-agile-manifesto/
- Atlassian. (n.d.). What is kanban? Retrieved July 16, 2020, from https://www.atlassian.com/agile/kanban
- What is Scrum? (n.d.). Scrum.Org. Retrieved July 16, 2020, from https://www.scrum.org/resources/what-is-scrum

Robinhood: An Unworthy King

- Broadband Search. (n.d.). Mobile Vs. Desktop Internet Usage (Latest 2021 Data). BroadbandSearch.Net. Retrieved March 28, 2021, from https://www.broadbandsearch.net/blog/mobile-desktop-internet-usage-statistics
- Anderson, M., & Kumar, M. (2019, May 7). Digital divide persists even as lower-income Americans make gains in tech adoption. Pew Research Center. https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/
- U.S. Securities and Exchange Commission. (2020, December 17). SEC.gov | SEC Charges Robinhood Financial With Misleading Customers About Revenue Sources and Failing to Satisfy Duty of Best Execution. SEC. https://www.sec.gov/news/press-release/2020-321
- Peters, J. (2020, March 9). Robinhood experienced its third outage in a week as US stocks have plummeted. The Verge. https://www.theverge.com/2020/3/9/21171584/robinhood-outage-week-us-stocks-third-market
- Dokoupil, T. (2021, February 9). Alex Kearns died thinking he owed hundreds of thousands for stock market losses on Robinhood. His parents have sued over his suicide. CBS News. https://www.cbsnews.com/news/alex-kearns-robinhood-trader-suicide-wrongful-death-suit/
- Fitzgerald, M. (2021, January 28). Robinhood restricts trading in GameStop, other names involved in frenzy. CNBC. https://www.cnbc.com/2021/01/28/robinhood-interactive-brokers-restrict-trading-in-gamestop-s.html
- Salesforce. (n.d.). What is CRM? Retrieved March 28, 2021, from https://www.salesforce.com/crm/what-is-crm/